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PROCEEDINGS OF THE INTERDEPARTMENTAL WORKERS' COMPENSATION TASK FORCE CONFERENCE ON OCCUPATIONAL DISEASES AND WORKERS' COMPENSATION, 1976

PREPARED BY THE
SUBCOMMITTEE ON LABOR
OF THE
COMMITTEE ON LABOR AND
PUBLIC WELFARE
UNITED STATES SENATE
AND THE
COMMITTEE ON EDUCATION AND LABOR
HOUSE OF REPRESENTATIVES



FEBRUARY 10, 11, AND 12, 1976
CHICAGO, ILL.

Printed for the use of the Senate Committee on Labor and Public Welfare
and the House Committee on Education and Labor

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TASK FORCE CONFERENCE ON OCCUPA-
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PENSATION, 1976

COMMITTEE ON LABOR AND PUBLIC WELFARE

HARRISON A. WILLIAMS JR., New York

PREPARED BY THE

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(II)

FOREWORD

This document contains the proceedings of and the papers presented at the Interdepartmental Workers' Compensation Task Force Conference on Occupational Disease and Workers' Compensation. It will provide valuable and informative background in the area of occupational disease and how that disease affects, and will affect in the future, the Nation's system of workers' compensation.

It has been printed for the use and benefit of the Members of the Senate and the House of Representatives. It is a valuable tool for the public.

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It has been printed for the use and benefit of the Members of the Senate and the House of Representatives and to provide a resource tool for the public agencies as well as individuals concerned with this subject. It is the committees' wish that this compilation prove a useful guide to a very important and timely issue.

U.S. House of Representatives
Washington, D.C.

HARRISON A. WILLIAMS, Jr.,
Chairman.

Dear Mr. Chairman:

(v)

In February of this year, under the auspices of the Interdepartmental Workers' Compensation Task Force, established by the President, a conference was held in Chicago on occupational disease and workers' compensation. At this conference a number of experts in the field -- doctors, lawyers, industrial health experts and others -- who had been selected by the Task Force presented papers and discussed occupational disease and workers' compensation.

The report of the proceedings of this conference was made available to us by Mr. J. Howard Jones, Jr., Director of the Interdepartmental Workers' Compensation Task Force. I believe these proceedings should be available to the Members of our Committee in connection with our study of the need for Federal standards for workers' compensation. Utilization of these proceedings should not be taken as endorsement by myself or any other Member of the Committee of the views expressed by the participants in this conference; but it is important, I think, that the material contained should be available to us. I am therefore requesting that you have these proceedings printed as a Committee document for our use.

ROBERT V. MURPHY
Chairman

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WASHINGTON, D.C. 20515

June 4, 1976

The Honorable Carl D. Perkins, Chairman
Committee on Education and Labor
U.S. House of Representatives
Washington, D.C.

Dear Mr. Chairman:

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Sincerely,

DOMINICK V. DANIELS
Chairman

DVD:dm

(VII)

CONTENTS

Foreword	Page v
Days of proceedings:	
First day, February 10, 1976	1
Second day, February 11, 1976	73
Third day, February 12, 1976	149

APPENDIX

Report of proceedings	243
Magnitude of the Occupational Health Problem, the, by Nicholas A. Ashford, Ph. D., J.D., Massachusetts Institute of Technology, Cambridge, Mass.	286
Multiple Factor Interactions in Occupational Disease, by Irving J. Selikoff, M.D., Mount Sinai School of Medicine of the City University of New York	303
Medical Aspects, by Thomas F. Mancuso, M.D., research professor, Graduate School of Public Health, University of Pittsburgh	326
Occupational Disease and High-Risk Groups, by Sheldon W. Samuels	438
Occupation and Disease—A Guide for Decisionmaking, a contractor's report of a National Institute for Occupational Safety and Health project to aid State agencies, physicians, and others in making decisions regarding occupational disease compensation	447
Legal Aspects of Occupational Disease Coverage, by John H. Lewis, attorney	696
Administrative Aspects of Handling Occupational Diseases, by J. T. Noblin, chairman, Workmen's Compensation Commission, Jackson, Miss	720
Mancuso, Thomas F., M.D., statement by	730
Black Lung, a Study in Occupational Disease Compensation, by Nancy M. Snyder and Mark E. Solomons, U.S. Department of Labor	742
Programs To Protect Workers With Occupational Diseases, by Ronald W. Conley, compensation task force, and Joseph Halpern, University of Denver	808
Costs of Occupational Diseases, by Peter S. Barth, University of Connecticut, and Frederick C. Collignon, University of California, Berkeley ..	860

PROCEEDINGS OF THE INTERDEPARTMENTAL WORKERS' COMPENSATION TASK FORCE CONFERENCE ON OCCUPATIONAL DISEASES AND WORKERS' COMPENSATION, 1976

TUESDAY, FEBRUARY 10, 1976

U.S. SENATE,
PRESIDENTIAL TASK FORCE ON OCCUPATIONAL DISEASES
AND WORKERS' COMPENSATION,
Chicago, Ill.

The Conference met, pursuant to notice, at 9 a.m., at the University of Chicago, Center for Continuing Education, 1307 East 60th Street, Chicago, Ill., J. Howard Bunn, Jr., J.D., Director, presiding.

Chairman BUNN. My name is Howard Bunn and I am the Director of the Interdepartmental Task Force on Workers' Compensation. The Task Force is a Presidential Task Force which has as one of its primary goals, looking at the workers' compensation system and coming up with suggestions, recommendations, and ideas.

One of the areas vital to the workers' compensation system and one of the areas the task force is concerned with, is the occupational disease area. And this is the purpose of this conference, to convene a number of people knowledgeable in the field to look at the workers' compensation problem as it relates to occupational disease from various factions and various points of view.

The idea behind having this type of meeting is to have an exchange of views from people who represent nearly every group who has an interest in workers' compensation. We have tried to keep it well balanced and have people from organized labor, from management, the insurance industry, medical profession and so on. And we hope that as a result of the interchange we will develop ideas that will be helpful to us in our final report.

A word of caution to the people participating on the panel and those of you who at the appropriate time from the audience may have an opportunity to ask a question. And that is we are on a very strict time schedule and those of you who present papers and those of you who discuss papers and those of you who participate from the panel, you can rest assured at the appropriate time the moderator or I will stop you and call time if we are running behind our schedule as outlined on the agenda.

The reason we have to be very tough on this is because of the fact we have so much to cover in a few days, and if we start lagging behind we will never get through it. All of it is vital and it is important that we stick with the agenda.

The general format of the program will be one in which a paper will be presented and then there will be a discussant and the matter then will be open for roundtable discussion from the people here on the panel. At the conclusion of the allotted time for that, there will be another 20 minutes in which there will be audience participation. The first 10 minutes will go to the policy group or people connected with the policy group for the task force. They will have the first opportunity to speak and after that there will be 10 minutes for the audience to ask questions.

At the conclusion of that time, we will stop exactly at the conclusion of the 10-minute time segment and move on to something else.

At this time I would like to introduce the panelists and those people connected with the Occupational Disease Conference. There are a few of these people who are not here, some of them have flights that have been delayed. Nevertheless, I will go through it and introduce all of the people whether they are here or not.

The first person is Dr. Marvin L. Amdur. Dr. Amdur is the director of the Buffalo Medical Center, a position which he has occupied for many years. He is a graduate of the University of Buffalo School of Medicine.

Next is Dr. Nicholas Ashford, who is with the Massachusetts Institute of Technology, as a senior research associate.

Next is Dr. Peter S. Barth, head of the Department of Economics at the University of Connecticut. Dr. Barth is former Executive Director of the National Commission on State Workmen's Compensation Laws.

Let me point out all of these people have very distinguished backgrounds and if time would permit I could spend considerable time giving their papers and books they have written. Due to the time element, we will dispense with that.

The next is Dr. Monroe Berkowitz, who is a professor of economics at Rutgers University.

Next is Dr. John S. Burton. Dr. Burton was Chairman of the National Commission on State Workmen's Compensation Laws and at the present time is an associate professor of industrial relations and public policy at the University of Chicago.

Next is Dr. Fred E. Collignon, acting assistant professor for the Department of City and Regional Planning of the University of California at Berkeley. He is also doing a considerable amount of research for the task force.

Next is Dr. Donald F. Conley. He is the research director for the task force. Dr. Conley formerly was in the research area with HEW.

Next is Dr. Morton Corn. Dr. Corn is Assistant Secretary of Labor for Occupational Safety and Health, a position which he recently assumed. Dr. Corn comes to OSHA from the University of Pittsburgh and we are pleased to have him here representing the Secretary of Labor.

Next is Dr. Ernest M. Dixon. Dr. Dixon is the medical director for the Celanese Corp. He is a doctor of medicine.

Next is Dr. Philip Enterline who has published extensively and is extremely well known, and I am sure all of the people participating on this panel realize his speciality is in the field of biostatistics, and he

is a professor of biostatistics at the Graduate School of Public Health at the University of Pittsburgh.

Next is Dr. John Finklea. Dr. Finklea is the Director of the National Institute for Occupational Safety and Health.

Next is Mr. Russell Guy. He has not arrived yet but he will be here. Mr. Guy is an attorney and employed by Bethlehem Steel.

Next is Dr. Joseph Halpern who is the associate director for the Center for Social Research and Development at the University of Denver.

The next is Mr. Clarence Johnson. Mr. Johnson is currently senior vice president and general counsel for the Argonaut Insurance Co. He is a past chairman of the workmen's compensation section, American Bar Association.

Mr. Andrew Kalmykow is assistant general counsel for the American Insurance Association.

Next is Dr. Donald Lassiter. At this time Dr. Lassiter is a Special Assistant for Health with OSHA.

Next is Mr. John Lewis. Mr. Lewis is an attorney in Florida. He is the former General Counsel to the National Commission on State Workmen's Compensation Laws.

The next attorney is Mr. R. R. McMahan from here in Chicago. He is originally from Nebraska and practices law here.

Next is Dr. Thomas F. Mancuso, research professor at the Graduate School of Public Health at the University of Pittsburgh.

Next is Mr. Tony Mazzocchi. Mr. Mazzocchi has been an official with the labor movement since 1950 and is the citizenship-legislative director for the Oil, Chemical and Atomic Workers International Union.

Next is Mr. J. T. Noblin, chairman of the Workmen's Compensation Commission in Jackson, Miss. He is also president of the International Association of Industrial Accident Boards and Commissions.

Next is Judge Ben Novicoff. Judge Novicoff is the presiding judge of the Nebraska court.

Next is Dr. John F. Ostertter, consultant in occupational health at Halcyon in New York.

Next is Dr. Norbert J. Roberts, who is the medical director with the Exxon Corp.

Next is Mr. Sheldon Samuels, director of health and safety and environment for I.U.D. out of the AFL-CIO.

Someone else who is not here is Mr. Richard Schubert, who is an assistant vice president for business affairs for Bethlehem Steel. He is also a former Under Secretary of Labor and will join us later this morning.

The next is Dr. Irving Selikoff. Dr. Selikoff is a professor of medicine and is associated with the Mt. Sinai Hospital in New York. He is very distinguished in the field of occupational disease.

Next is Ms. Nancy M. Snyder, Associate Director for Coal Mine Workers' Compensation with the U.S. Department of Labor.

Mr. Mark E. Solomons, out of the Office of the Solicitor in the U.S. Department of Labor. He is now dealing with the black lung program.

Usually at the conclusion of a conference of this type one takes time to thank the people that put it together. Due to the fact some of the

people that participated in the planning of this conference will not be here for the entire agenda, at this time I would like to thank the planning group that assisted the task force.

I would also like to take the time to thank those people on my staff that spent many hours of time: Ms. India Wimberly, who worked a great deal of time on the details of organizing the matters relating to the facilities here.

And Mrs. June Robinson, who is seated at my left, who I think all the panelists have had an opportunity to get to know. You have spoken to her over the phone and she is probably responsible more than anyone else for the conference coming together in the format it is today. She has spent a great deal of time and I am considerably indebted to her for a great amount of work.

I think it is important for the panelists today to recall and remember that you were given a series of issues on which, at the conclusion of each session, we will try to reach a consensus of thinking of the group. Relative to these issues, if you don't have them before you, it would be a good idea to get them, and it is something the moderator will call to your attention at the beginning of each session and you need to be thinking about those as we go along.

If there are any other issues we need to discuss in developing a consensus, we will have to deal with that at the time. It is important we try to reach a consensus in these areas. If not, we will at least have an articulation of the differences of opinion by the various members of the panel.

If any member of the panel has not received all the papers involved in the Conference, at the appropriate recess, please see Mrs. Robinson to my left, and she will present you with any paper you might not have.

There is also a gentleman who was originally planning to be here who has spent a great deal of time helping the Task Force plan this conference, and that is Mr. Al Weiss, Asst. Secretary for Policy Evaluation and Research. Unfortunately, he is sick with the flu and cannot be here. In view of the fact he has spent so much time, I regret that he is unable to attend.

We are very fortunate to have with us the Assistant Secretary of Labor for OSHA, Dr. Morton Corn. At this time he will present his comments.

Dr. CORN. Mr. Chairman, ladies and gentlemen, colleagues.

During the early planning of this conference an invitation to greet participants was extended to then Secretary of Labor John Dunlop who agreed to welcome us all. I stand here in his place and convey to you his regrets at not being with us today, as well as his wishes for a successful examination of ideas related to these important subjects.

The good wishes of Secretary of Labor Usery are also with us today. His concern for occupational safety and health is deeply felt. He is, I am very pleased to inform you, committed to the reduction of health and safety hazards in the work environment and has offered his full support to OSHA to pursuing these goals.

He regrets not being able to join us today but sends his hopes to us for a good meeting.

Why are the subjects of the Conference so much in the forefront in the perception of one serving in the position I am serving in? Let me share some of the daily concerns of my office with you.

The Occupational Safety and Health Act of 1970 literally added a new right to the Bill of Rights. In section 2B of the act, it guarantees the right to a safe and healthful environment insofar as possible to each worker. I am not so sure this guarantee is fully appreciated by most people, even professionals in the field.

Although OSHA has seriously attacked the safety hazards of the work environment, it is generally acknowledged the problems of occupational diseases have barely been scratched.

Less than 10 percent of the approximately 80,000 inspections the agency performed in 1975 were committed to health. The bulk were committed to safety. The agency has almost 1,000 safety inspectors but only 248 health inspectors, and of the latter more than half are beginners or apprentices.

Assuming we can staff up to deal with health matter, and that is directed to me and I am committed to it, where shall the focus be? Thus to fully utilize our resources in the program of compliance activities, we must have data relative to disease incidence. At present our priorities are set mainly by safety statistics where a data base does exist.

It is this fuzziness and inability to reliably program our general inspection which caused the chemical sector in Richmond, Va., the site of the recent Kepone poisoning tragedy, to receive a relatively low scheduling priority. It was based on safety records of the chemical industry and not on the potential for occupational diseases. And the chemical industry is relatively safety conscious.

If the first need, that of identifying the problem can be met, we should also make inroads with respect to the impact of OSHA. The evaluation of the effectiveness of the regulatory program is an idea we are all, I am sure, sympathetic to. After all, we do desire that some good come from our money and energy expenditure.

At the present time we are "flying blind" in the area of occupational disease. This matter has arisen in my brief tenure in this position at two appropriation hearings connected with the 1977 budget and has also arisen in conjunction with hearings examining the Kepone tragedy.

How will we measure our effectiveness as we go about regulating? It may not be possible to achieve any valid measurement of impact for some time to come. Greater knowledge may lead to more efficient diagnosis and more extensive reporting.

These operational problems should not discourage us from getting started on this difficult problem and laying some base that is judged by all concerned to be a good base for occupational disease reporting.

The simplistic ideas of single-agent effects can only be associated with glaring overexposure to chemical agents in industry. Kepone and vinyl chloride are recent examples. The real challenge is to sort out the effects of multiple agents and industrial environments on chronic non-specific agent-induced diseases. When we unravel these facts the industrial environment will be a major contributor to many diseased states in aging men and women, particularly diseases of the respiratory tract.

Occupational health is a branch of preventive medicine although rarely viewed in this light. In the best of all possible worlds, preventive measures will avoid the occurrence of work-related disease. But until

then, and when illnesses do occur, how do we care for those victims of industrial disease? That brings me to the second part of the program.

Workers' compensation—its strength and weaknesses in its present operational mode—is the companion subject of the meeting.

I can only reflect on the fact that 20-some years ago when I was a graduate student at Harvard, the topic of workers' compensation was at that time one of the most provocative and controversial subjects, and my perception is it hasn't changed much in those 20 years.

Another aspect of the assessment of the problem is the economic factors associated with these two topics. From my standpoint, there is increasing pressure, in view of dwindling funds in what has been called a crisis of expectations of the last 10 years, to look very carefully at the dollar values of everything we are doing, including health. OSHA is now required by Executive order to file inflationary impact statements. What are the benefits that will accrue from our regulatory efforts? It is really not sufficient to talk about the qualitative description of health. We are being urged to place economic values on these benefits. A practice which has been widespread in the public health field for years.

It is essential to know the incidence of disease to do this. Or we are guessing at the magnitude of the problem and any economic figures derived from the benefits will be "guesstimates." So I see the need for pinning this down in that area.

Finally I would like to close my opening remarks, which I hope indicate to you the sense of need I feel for clarification of the subjects on the agenda here, by a quotation that gave me some source of strength when I was a graduate student. It is engraved in the walls of the Harvard Medical School and is a Pasteur quotation: "Life is short and the art long. Experiment is difficult and decision is perilous."

I think in my mind this conference is an experiment, and we are in that difficult stage of sorting things out, and I hope you will come up with enough from this conference so we can go to the next stage, decisionmaking, which I think we will all agree on the subjects we are discussing today, will be perilous. But, I think we can improve on the present situation and I hope this conference will be a major stimulator of that improvement.

I wish you well for a good conference and welcome you.

Chairman BUNN. Thank you, Dr. Corn.

Before we get into the actual program, there are two or three vital points, I want to make. A couple I made before, but I think they are worth repeating.

First of all, the moderator in charge of a particular session will be in charge of that session and his position with regard to you people on the panel will be if he feels you are going far afield or getting into a subject matter being dealt with at a later session, he may interrupt and ask you to get back to the main point of that session. I will act as a backup to him, and if I sense it is going far afield, I will also interrupt.

When you speak as panelists, before you speak, please say your last name so that the reporter may have that to attribute the remarks to the proper person.

Keep in mind again we are trying to address serious issues and this is a format, or an effort toward trying to improve the handling of workers' compensation cases in the occupational disease area.

At this point I would like to present the Director of NIOSH, who are very much pleased to have with us, Doctor Finklea.

Dr. FINKLEA. Thank you.

I am sure all of us appreciate the charge Mort gave us, and I am also sure we will give him a little something to help him in his difficult job.

I want to call the attention of the panelists to the paper Mr. Bunn distributed to us earlier, entitled questions for panelists to address. This paper gives you the outline that the task force would like for us, to comment on in each session.

Our first session will deal with the magnitude of the problem. As you can see from the format it will be led off by a summary of a paper from Nicholas Ashford, senior research associate for the Center for Policy Alternatives at MIT. And I would like to read the questions for you to keep them fresh in your mind before Nick takes off with his paper.

The first question: "What definition of occupational disease is most appropriate for defining the magnitude of the occupational disease problem?"

And I think you will notice Doctor Ashford in his paper has proposed such a definition and I ask you to pay careful attention to that and as to what modifications we might make.

The second question: "What quantitative measures or estimates are available to indicate the extent and characteristics of occupational disease and the resulting morbidity and mortality?"

Again, a good part of the paper addresses this question.

No. 3: "How can better data be developed immediately, that is during the next 1 to 2 years, and in the future, the next 3 to 7 years?" And the question is also asked who should do this and we are also asked to address particular questions that will come up in a later panel.

Specifically we are asked, "How can the Occupational Safety and Health Administration of the Department of Labor, the Bureau of Labor Statistics of the Department of Labor, NIOSH and other agencies such as the National Center for Health Statistics and the Social Security Administration, cooperate in the development, collection and analysis of data?"

Now with regard to the last point, Dr. Mancuso has some pertinent suggestions in his paper which will be given. I think though it might be appropriate if he shares those with us later in our discussion.

Now I would like to introduce Dr. Ashford who will give a summary of his paper dealing with the magnitude of the problem of occupational disease.

Dr. ASHFORD. In a sense I could have renamed my paper "A New Look at Religion," because I have been asked if I believe what I have written or what I read. I think the question is, "What is it we have seen and how much do we want to believe of what we have seen?"

The much-needed reform of the workers' compensation system cannot proceed far without a sensible appreciation of the magnitude of the occupational disease problem. Unlike industrial injury, a substantial proportion of occupational disease may have multiple etiology, may be complicated by nonoccupational factors, and may be difficult to diagnoses. In addition, occupational disease may be characterized by long latency periods which further complicate attempts to comprehend fully the extent and nature of the problem.

I have been asked to comment on the magnitude and nature of occupational disease as indicated by the best available evidence. This task in reality would require an open-ended research effort, and deal with a moving target. Furthermore, the interrelationship between occupational and environmental disease demands an examination of the epidemiological evidence from both the work environment and from cohorts drawn from different geographical regions and socio-economic groups.

The task is an enormous one, yet we already have indications of the possible seriousness of the occupational disease problem. What I hope to present is a sensible framework for discussion of the problem and not a definitive treatise on occupational disease.

What is important to grasp is that different and seemingly unrelated data appear to point to the fact that an alarming amount of the disease from which we suffer today is of occupational origin.

A main underlying question in our discussions at this conference should be to what extent we need to know the magnitude and nature of the problem in order to suggest workable and responsive reforms in the workers' compensation system. For the purposes of workers' compensation system, the standard of proof required to recognize a pathology as occupational in origin need not be the same as that required for setting an occupational health standard.

I would submit that the resistance to include occupational disease in the workers' compensation system lies not so much in the anticipation of higher premiums per se, but more in the large uncertainty which we attach to the magnitude of the disease problem and subsequent payments.

Furthermore, to the extent that our present occupational disease problems are chronic in nature, we may be faced with an immense backload of payments for past sins.

One thing is clear: Whether or not a large proportion of disease is occupational in origin, much environmental disease does have its origin in the industrial process.

Those who are disturbed by that notion, that we may recommend an overpayment for disease which is accepted as occupational on less than certain evidence, may find comfort in the realization that we are undercompensating for environmental disease of industrial origin.

In its broadest sense, then, I would suggest that the definition of occupational disease include disease which is caused solely or partially by occupational factors and which results in a reduction in a worker's physical and mental well-being, even if that disease does not become manifest until after he or she has left the work force.

How large are the problems of occupational and environmental disease? Let us examine the numbers, but with Disraeli's reminder that there are three kinds of lies: Lies, damned lies, and statistics.

Most epidemiological evidence for the identification of causal agents comes from the occupational setting, where workers are exposed to high concentrations of potential hazards for long periods of time. Other epidemiological evidence, such as cancer incidence by geographical region, also provides insight, especially as to the multiple etiology of disease.

Prior to enactment of the OSHA Act there was no systematic attempt to collect data on the incidence of occupational illness and disease, as opposed to injury, in the United States.

One result of the OSHA Act has been the initiation of new record-keeping and reporting practices which require firms to record each occurrence of occupational disease among their employees. Yet the results of the data collection under the new statistical reporting system indicate serious deficiencies in the implementation of accurate reporting practices with regard to the incidence of occupational disease.

According to BLS statistics, occupational illness accounted for under 5 percent of the total incidence of occupational injury and illness during the period between July 1, 1971, and December 31, 1972. The 1973 survey reported even less occupational illness.

These estimates reveal that roughly 133,000 cases of occupational illness, a large proportion of which were of the relatively nonserious variety—dermatitis, for example, accounted for 33.9 percent of all recorded occupational illness—and only 600 deaths from occupational disease were recorded during the last 6 months of 1971. Yet, other estimates indicate that the true incidence of the more serious types of occupational disease is substantially greater.

The Public Health Service estimates 390,000 new cases of occupational disease annually. Epidemiological analyses of excess mortality among workers in several industries suggest that as many as 100,000 deaths occur each year as a result of occupational disease. Thus, we are faced with estimates for death from occupational disease which range from about 1,000 to 100,000 annually. There is indirect evidence that 1,000 deaths annually is a serious underestimate.

Evidence from the insurance industry indicates that the excess risk of death, in actuarial terms, is substantial among certain occupational groups. This excess risk is on the order of magnitude of all the other risks of death which we face, in other words, the probability of death, given age, race, sex, et cetera, facing members of certain hazardous occupations, is in some cases greater than twice the norm for a matched cohort drawn from the general population.

Occupational and environmental factors may very well play a far more significant role than is presently realized in the causation of the major diseases and health problems which face us. The statistics I will cite now are a different way of getting to this figure of 100,000 annually.

Two million people die every year in the United States. Heart disease, the leading cause of death in the United States, is only 25 percent explained by known physiological and environmental factors such as overweight, hypertension, serum cholesterol, and cigarette smoking. An unknown, but quite possibly substantial proportion of the 75 percent of heart disease risk which is presently unaccounted for could be related to stress, present in both the work and general environment.

To what extent the stress is incurred by exposure to toxic materials and pollution, or stress from the psychosocial aspects of the work environment, is very difficult to determine. In this regard it is inter-

esting that a recent study of Japanese Americans has exploded one of the myths about the lower rate of heart disease among the Japanese. It was previously postulated that their diet was important. The study compared a number of subgroups among Japanese Americans, all of whom have the same diet, not very different from the basic Japanese diet. Those Japanese Americans who have acclimatized themselves to the American lifestyle exhibit a high rate of heart disease; those who have retained the traditional Japanese values do not, and instead resemble the Japanese in Japan. I think these kinds of studies indicate that heart disease in fact may have a very large stress component, perhaps work-related stress.

Cancer is the second leading cause of death in the United States today with an annual toll of 365,000. The incidence of cancer has risen rapidly with industrialization: in 1900, 3.7 percent of deaths were due to cancer, but by 1968 the proportion of deaths from this cause was 16.5 percent. In part, improved diagnosis and longer life expectancy due to decreasing prevalence of previous health scourges are responsible for this dramatic increase. Nevertheless, there are indications that the true incidence of cancer has in fact been on the upswing.

The HEW task force on research planning in environmental health science reported that there is abundant evidence that the great majority of malignant neoplasms, probably over 90 percent of the total, are induced, maintained or promoted by specific environmental factors. Many of the known environmental causes of cancer are physical and chemical agents that directly concern the environmental health professions, carcinogenesis must therefore be regarded as one of the most significant potential consequences of environmental contamination.

Of the 80 or 90 percent of cancer which could be environmentally caused, it is not presently known how much is occupationally related. There seems to be a general consensus among cancer researchers and environmentalists that one-quarter to one-half of this figure is complicated by occupational factors.

The experience of chemists, asbestos workers, underground uranium miners, and most recently rubberworkers handling vinyl chloride, as well as other occupational groups, amply document the cases that excess cancer of various types is indeed occupationally related.

This next piece of evidence is something I picked up quite separate from my involvement in occupational disease. In 1968 I was told by a statistician for the National Air Pollution Control Administration that he had observed that chemists as a group die 5 years sooner than physicists or mathematicians whose mortality and morbidity characteristics were essentially identical. These findings would seem to indict chemicals in general as a cause of death and would seem to make the suggestion that only a few chemicals are doing the harm improbable.

The recent work on cancer variations by geographical region in the United States released this year provides even more substantiation that a substantial portion of cancer in our society results from the industrial process. The high cancer incidence rates, among white males by the way, are found in what is now becoming known as the cancer belt—from Washington, D.C., to Boston; in Gary and Chicago; at the mouth of the Mississippi—New Orleans where the dumped chemicals accumulate; and in Oakland, Calif. Cancer in different high-

incidence counties varies as to its type, providing further evidence of the chemical and industrial origin of the problem.

Of particular significance is recent work from the National Cancer Institute in an appropriately titled paper, "Cancer Mortality in the United States Counties with Chemical Industries." The abstract is worth quoting here:

Geographic analysis of United States cancer mortality, 1950 to 1969 revealed excess rates for bladder, lung, liver and certain other cancers among males in 139 counties where the chemical industry is most highly concentrated. The correlation could not be explained by confounding variables such as urbanization, socioeconomic class, or employment in nonchemical industries. If the excess cancer mortality in this area is due to industrial exposures, the actual risk of cancer among certain chemical workers must be very high. The correlation was limited to counties associated with specific categories of the chemical industry, many involve known occupational hazards, while others suggest new leads to chemically induced cancer in man.

Since the production of petrochemicals in the United States has doubled every 5 years since the end of World War II, the incidence of cancer characterized by long latency periods may be expected to rise significantly over the next 20 to 30 years. This expectation coincides with considerable legislative activity geared toward chemical regulation—especially of chemical carcinogens.

One recent and alarming statistic reported by the National Center for Health Statistics is the 5.2-percent increase in the annual death rate from cancer in the first 7 months of 1975—a rate five times the expected increase.

Now, since my writing this paper, it has been drawn to my attention this was in fact a statistical fluke, and there was only a 2-percent rise instead of a 5-percent rise. If your religion makes you feel that is a much better number, I hope you feel solace. I continue to be alarmed at a 2-percent rise in a society that has the knowledge we do.

Chronic diseases of the respiratory system have been reported with increasing frequency in the United States and have become major causes of death and disability. Chronic bronchitis and emphysema are the fastest growing diseases in the United States. They account for the second highest number of disabilities under social security and have doubled every year since World War II, although there is some evidence that a plateau has been reached.

Incidentally, this doubling rate equals that of petrochemicals production mentioned earlier. Although this does not prove a causal relationship, this observation, coupled with many others, suggests that chemicals and other sources of pollution contribute significantly to our occupational and environmental health problems, and hence to a large part of our general health problems.

Much of the respiratory disease which plagues the worker is also known to be job related. Both specific diseases such as coalworkers' pneumoconiosis and general emphysema and chronic bronchitis can be of occupational origin. But, let me come to this point: even if only 5 percent of heart disease, cancer, and respiratory disease were in fact occupationally related, the annual number of occupationally caused deaths would be 60,000. Thus, the public health service estimate of as many as 100,000 may not be unreasonable. The BLS figure of 1,000 per annum is clearly way out of line.

Mental illness is another leading public health problem which may be far more extensively job related than is presently realized. The contribution of occupational stress and hazardous, unpleasant or monotonous working conditions to the promotion of mental health is not well understood.

At the present time, though, the incidence of mental health problems is known to be substantial among certain occupational groups. Recent evidence that certain prevalent forms of mental illness—such as schizophrenia—may be caused by chemical agents adds another dimension potentially of great importance to the possible links between occupational factors and mental health problems.

The Discher study recently made for NIOSH compiled data that showed that 31 percent of medical conditions found in 908 participants were probably of occupational origin; and an additional 10 percent of suggestive history. The probable occupational disease incidence was 28.4 per 100 workers. This is important because only 2 percent of this occupational illness was reported on the employer's log and only 3 percent was found in workers' compensation records.

The occupational disease profile in the study indicates that skin diseases, once thought to comprise the bulk of occupational disease, account for only 18 percent. Hearing loss claims 28 percent.

The remaining 54 percent are explained by respiratory conditions, toxic effects, eye conditions, anemia, and diseases of the musculoskeletal and connective tissues. This survey corroborates what the previous epidemiological studies suggested. A large amount of serious disease could be of occupational origin.

The above discussion touches only lightly on the nature and dimensions of occupational and environmental disease. There are, of course, numerous detailed epidemiological studies linking specific occupational hazards to disease. For example, chromate- and arsenic-linked cancer. Honest people will differ as to where on the spectrum of evidence from suggestive to conclusive any particular study lies. Many of the participants of this conference will have, or know of, additional information sources.

My own observation is as follows: In the 4 years during which I have been writing and speaking on these issues, I have witnessed study after study reveal more and more disease to be of occupational origin. I am afraid we are sitting on top of a very real and, unfortunately, large occupational disease problem.

Those who argue honestly about the validity of any particular study will serve the valuable function of encouraging responsible research efforts. However, the policy question is really focused on what quality of evidence is required in order to take political and ameliorative action.

The present costs of workers' compensation, of course, do not reflect compensation for most occupational disease. The projected costs would depend upon whether impairment as well as disability were compensated and on compensation schedules for various degrees of functional disability. It is worth noting that chronic disease which can leave a worker impaired for many years—often with his condition worsening over time—could run up the cost of workers' compensation, even if compensation were conservatively awarded in each instance.

Occupational disease imposes a large social cost on those afflicted. It should be no surprise, therefore, that internalizing these costs through workers' compensation would also be large.

Thank you.

Dr. FINKLEA. Thank you. Our first discussant of this paper is Dr. Enterline, who as you heard is a professor of biostatistics at the Graduate School of Public Health at the University of Pittsburgh.

Dr. Enterline?

Dr. ENTERLINE. I see Dr. Ashford has written a book. I hope I am not in it. I think this is a very formidable assignment given to Dr. Ashford, that is to estimate the magnitude of the occupational disease problem in the United States. And, if we go the workers' compensation route, clearly one factor that should be considered is at what cost, if all occupational disease is to be compensated.

I would agree with Dr. Ashford's definition of occupational disease as that which is caused solely or partially by occupational factors. Essentially this is the definition in most full-coverage workers' compensation programs. I think we must be careful, however, to separate occupational from other environmental diseases.

Certainly, it is a mistake to equate all environmental disease with the industrial process. And that's the way I interpret some of Dr. Ashford's comments. Maybe we disagree on the term environmental disease, but I think of this as disease caused by something in man's environment, and I believe this is the sense in which, for example, the statement that 80 percent of cancer is of environmental origin was made.

As I was reading Ashford's paper, and to illustrate my point, I happened to see an article in the January 15 issue of the New England Journal of Medicine on mortality among Mormons and non-Mormons in Utah. Mormons have a much lower mortality rate from nearly all cancers, a fact attributed by the authors to their way of life—mainly abstinence from tobacco and alcohol. They didn't mention, or possibly think of, occupational differences. The difference between Mormons and non-Mormons is in my view largely environmental, but probably not related to industrial processes.

It is true that there certainly, for some diseases, there is an upswing, and I think cancer is one example. This is something that we need to be concerned about.

I would say 1975 was an unusual year. There was a flu epidemic. That was apparently the reason for some of the observations that appeared in the original paper Dr. Ashford prepared.

I also think we have to keep these trends purely in perspective, and keep in mind there has been improvement in the life expectancy of the American worker.

In 1930, for example, at age 25, a man entering the labor force could look forward to 41.8 years of life. In 1950, it was 44.9 years, and in 1973, 46. So, we are making some improvement in spite of the increased industrialization.

Certainly the situation now is probably better than that which would have been found 20 or 30 years ago. OSHA must already have had some impact, and moreover, occupational health efforts date back in this country to at least 1912, and NIOSH probably had some effect on health of the worker.

This is not to say that there aren't many as yet undefined or undetected hazards in the work environment, and that further effort won't uncover these. I don't know if what will be found can be considered alarming in the overall context of this meeting, but I'm sure we're in for some surprises when we dig into some occupational environment previously thought to be fairly safe or just not looked at.

Some of these hazards may affect only a relatively few men and would have little impact on a total workers' compensation program, but may have widespread implications, particularly for the consumers of the product involved.

What is the current magnitude of the occupational health problem in the United States? Certainly insurance companies should know how mortality risks vary among various occupations—that's their business—and I'd accept the twofold excess in some occupations. Some of this excess is clearly occupational, as, for example, work accidents for coal miners.

It is also clear that there is great geographic variation in mortality within the United States. But what is this variation due to? I once studied geographic variations in coronary heart disease, your chances of dying at ages 45 through 64 in Savannah, Ga., were over twice your chances in Lincoln, Nebr. And this has subsequently been investigated fairly carefully. Some of the variation may be due to occupational factors, but probably not much. I'm equally suspicious of geographic variations in cancer, and would hesitate to attribute much of this to occupational factors. Other environmental factors may be operative here, however, and somewhere involved in the "cancer belt."

I would like to approach this problem, as to what is environmental and what is occupational, by the approach taken some years ago by Ian Higgons, when he reasoned that if variations were for males only, it might be occupational; whereas, if females varied in the same way, some other factor or factors must be involved.

With this in mind, it's probably significant that the geographic variation in female cancer mortality is as large as the geographic variation in male cancer mortality, so that we must be careful in attributing this variation to occupational factors as opposed to some other kind of environmental influences.

Having said all this, it is obvious I don't know the answer, or have even given the subject much thought. People who make estimates often are selling something, a program or a point of view. For example, the doubling of mortality from chronic bronchitis and emphysema every 5 years, as mentioned by Dr. Ashford, is not consistent with the pathophysiology of these diseases, or with other information we have about these diseases. And while it is a good selling point for a national attack on these diseases, it probably misrepresents the true situation.

Furthermore, what we die of and what we die with shouldn't be confused. So that the ninefold correction factors in chronic respiratory disease statistics must be used very carefully. One hundred fifty thousand people may die with C.B. & E., but not as a result of C.B. & E. We are talking really about the cause of death as opposed to what people have at the time they die.

Nevertheless, persons who make estimates of the magnitude of disease problems must be listened to since they have given the subject

some thought and attention. And I would give considerable weight to NIOSH's estimates of the occupational health problem. The truth, if such exists, comes only with hard work and well-designed epidemiologic studies and may, in the final analysis, be only one consideration in determining the size of the compensation problem.

I was going to comment on Dr. Ashford's statement about the cancer increase. I think, however, he has taken care of that. Dr. Ashford mentioned the Discher studies which I haven't seen before, and I think that is a very interesting approach. I couldn't find a copy of the report in our library and can only wonder who the participants were in the studies. You mentioned 908 participants, and I suspect they are talked about in the study later.

If in fact these were a random sample of the working population, some kind of sample, and Dr. Ashford referred to this further as an occupational disease profile, I think it would be terribly important insofar as determining the prevalence and maybe even incidence data of occupational conditions. Of course, workers' compensation deals in the long run with incidence, and not prevalence. So we have to translate them into incidence data for the purposes of this meeting. So, I think if a translation could be made, this would tell us the probable volume of claims under an expanded workers' compensation program.

Other data Dr. Ashford presents such as the number of occupationally related deaths, are really too difficult to translate into a workers' compensation program, it seems to me.

In closing, I think Dr. Ashford has made a good effort and certainly recognizes how lousy the data on his assigned subject really are.

Dr. FINKLEA. Thank you, Dr. Enterline, for that encouraging conclusion.

We would like to now turn to our second discussant, Dr. Don Lassiter, who is Special Assistant for Health Affairs at the Occupational Safety and Health Administration. Don?

Dr. LASSITER. I will summarize briefly some of the important points I thought Dr. Ashford brought up, because now Dr. Discher has been asked to take an additional 5 minutes after my presentation, and you will have to listen to two instead of one.

The paper Dr. Ashford presented discussed the magnitude and nature of occupational disease as indicated by the best available evidence. These are just some summary remarks and I would like to make some observations.

We also want to know to what extent do we need to know the magnitude and nature of the problem in order to make or in order to suggest workable refinements in the workers' compensation program. Of course this goes to other situations in which we need to make policy decisions regarding other matters pertaining to occupational health.

He mentioned the large uncertainty of the problem. The realization of etiology or contributing factors of occupationally related disease is years too late to prevent exposure to a large number of workers.

I won't get into the statistics he mentioned except for the fact that when we talk about the numbers of occupationally related deaths per year, the numbers of occupationally related diseases per year, the range

in reported deaths of between 1,000 and 100,000, the possibility that 75 percent of all heart disease is unexplained, that 80 percent of all cancer is of environmental origin, often comes down to defining that portion of heart disease or cancer we feel fairly certain or are on sure ground can be contributed to a certain etiology.

This automatically leaves the remainder to the environment regardless of how we want to divvy that up. If it is 80 percent now, as we begin to find other causes for things such as cancer, other environmental causes, that proportion will shrink. Definitely I think most scientists in the ecology field agree a large portion of cancer is associated with environmental factors. The amount directly attributable to occupational environment, either directly or indirectly, of course, will not be known for many years, except we are finding more and more specific instances of directly associated cancer with occupational exposure.

But at this time, those are largely leftover-type figures.

I won't mention the incidence of the increase of 5.2 percent in cancer except to reiterate the fact even a small increase is significant, but the 5.2 percent that raised some anxiety was explained by Dr. Leonard Keyossa at the Cancer Institute, and was reiterated by Dr. Enterline.

I think many can take issue with the reliability of statistical information reported and with extrapolations based on such information. However, no better statistics are available. Only different statistics lacking the same reliability.

And I think we need to look at the original question Dr. Ashford raised in his paper concerning to what extent do we need to know the magnitude and nature of the problem in order to look at workable solutions. There is a second question to that, though, "What is it worth to find out?" That is, at what point does obtaining greater statistical reliability concerning occupational illness and injury become economically feasible?

I think this necessitates looking a bit further, or going back to a kind of inventory approach, and it is one presently OSHA, NIOSH, and BLS are currently monitoring, in terms of a study addressing these latter questions concerning the magnitude of the problem, concerning an inventory approach to find out exactly what data does exist, and how can this data, perhaps, all these data sources come to bear on the problem.

And I believe Howard Bunn will now introduce Dr. David Discher who will provide additional comments on this.

Chairman BUNN. With no further ado, Dr. Discher.

Dr. DISCHER. To know the national occupational disease frequency and its severity; to know the casual factors, especially the presence or absence of environmental standards applicable to the causation; to know the occupation of those affected, the type of industry; to know the many contributing factors that can be identified with a given disease; to know all these things, I think it is obvious, that for the full range of occupational diseases, is not all that valuable unless somebody can use it.

Workers' compensation as a data base presumably could be used to priorities and orient inspections; it could be used to modify standards to health, and prioritize research, or health in a variety of similar government functions. And there would be an actual proposal then to

utilize this information, and, yet, when one looks for utilization of workers' compensation as a major resource for major occupational disease or injury statistical data, one does not find such a system. And I guess the question should be asked, why not?

Some might propose the reason is because workers' compensation data is so different, that one cannot collate disease data, for example, from separate jurisdictions. Or that the mass of the claims is just simply too costly to process considering the way claims are processed for the purposes intended. Or that the diagnostic procedures are too heterogeneous, or that causal factors are not sufficiently elucidated by the adjudication to be useful in planning prevention programs.

Or one might conclude that even if all these problems were ignored, and the data would be developed, that occupational safety and health planners and evaluators probably wouldn't pay any attention to it anyway.

I believe there is good reason to accept that all of these are in part true, and yet such an acceptance is fairly shortsighted, and I hope I can fairly directly explain this.

As alluded to earlier, S.R.I. has undertaken an evaluation of various existing methods for national occupational injuries and disease systems, and we are proposing a performance model which we feel will be useful to OSHA and NIOSH and the program operation.

The work began with an examination of 16 potential resources. Workers' compensation was one of these, and the Bureau of Labor Statistics' recordkeeping, which is the only one now in operation providing some basic purposes of the national estimates, was another. I won't take the time to list the other 14. But, each was considered from the standpoint of existing gaps and proposed modifications that could result in assisting Government programs in setting priorities or in program evaluation.

From the outset we admitted that information about job injuries and disease come to be known in a variety of ways and a national system would only be a partial answer to a major need. Moreover, we emphasize that more important than new and better data basis, the critical aspect of the system would be a Government group dedicated to linking the better data to the users of the Government program and to obtain user input into the design and operation of this system.

Although we saw many gaps and procedural problems in the workers' compensation program, we are going ahead and proposing it as one key way of providing disease and injury incidence data with a meaningful index of severity, and a way of providing for several possible causal and contributory elements needed in such a system.

The population covered by workers' compensation is a problem. Yet a cluster of States does have good coverage. However, to say in any of these States we know by census or any other method the population at risk is to grossly exaggerate the workers' compensation system and how it operates.

Limits on allowed or scheduled conditions also represent problems for our system. Moreover, full and complete recognition of the occupational disease is a broader problem than State legislative restrictions, and centers to a great extent on physician education and practice.

Since the processing of claims can be structured so as to furnish disease reports for statistical analysis, we view this aspect of workers'

compensation as a favorable element for the development of a national system. Assuming one could motivate State administrators to report according to national guidelines.

This brief assessment from workers' compensation that I am telling you about now was from standpoint first of the denominator base of occupational titles and numbers at risk. Second from the standpoint of numerator evidence of events of occupational disease, and third the processing of information.

And that led us to consider how the various deficiencies in existing programs might be handled. In overview we saw that this would be a morbidity reporting system of occupational disease and injury and would probably best be operated as a sample of work sites assigned by the Federal Government on an annual basis to all the State certifiers, such as the administrators of the workers' compensation system.

Such an annual sample would require of certified States not only the submission of all enumerator events for a given year in each plant, but also would require development of occupational title information on the plant and population at risk. Much more than the employers are now furnished or able to furnish under the recordkeeping requirement.

I won't go into the details of all the problems such a proposal would face. We would like to hear your comments on those programs. One crucial aspect would be to relate to developing reporting requirements and quality control of State programs. An element that may compromise the national sampling characteristics is that many States would fail to cooperate.

Solutions to this are not readily apparent. Regardless of how poorly disease is recognized and reported in certain States, we may never know how much is recorded in workers' compensation files unless a retrievable system along the lines of a national certification system is established on an annual sample plant basis. Certification criteria have been discussed many times and the need for such data and such procedures is no less apparent today.

Perhaps we should go ahead and pull our national sample and report our national estimates from that cluster of States willing to be certified and go ahead. A delicate balance obviously exists.

The potential benefits of the workers' compensation incidence data with the detail of severity, causal factor, contributory factor, that are in those records in a small cluster of States, probably because of the cooperation element I indicated previously—versus the information we now have supplied to us on an annual basis from employers through the Bureau of Labor Statistics—do we need both?

In fact, maybe there is merit to that, or do we need these? Perhaps we need to consider that as well.

The last question raises an element of what will we do with it if we do obtain it? Are we going to use it to help plan and evaluate programs? Well, I think this would be a justification for it if we could develop such a potential.

In conclusion we examined many programs, that same 16 I talked about, that might be proposed to answer the question about the magnitude of occupational disease and concentrated on the elements we thought were most important, elements that would be used by the

programs, particularly OSHA and NIOSH. We were intrigued with the possible benefits to Government users if we could report a national sample of workers' compensation records. Recognizing there is going to be a lack of cooperation and that most disease isn't recorded or reported anyway.

In our final report to OSHA on this contract, we will recommend this component, not simply to assist the Government in understanding national occupational disease and injury morbidity questions, but also to get interaction where the disease recognition problem is, at the State and local level.

I would like to, if I may, Mr. Chairman, make a comment concerning the questions raised by Dr. Enterline. Is that acceptable at this point?

Chairman BUNN. I think we have a few more minutes before the break. Go ahead.

Dr. DISCHER. I apologize the report was not available in your library. I don't know what the distribution has been. The responsibility for that was that of NIOSH, and the project officer is Dr. Dickerman. I am sure that distribution of that report could have been a problem and I hope it didn't compromise the evaluators in considering Dr. Ashford's presentation.

If it did, and the two questions you raised are: Was it a sample of a population of workers; and second, did we translate the prevalence into incidence data since both BLS and workers' compensation data as you noted are incidence data.

On the latter point, I can assure you when you get a chance to study the report, we did this, I think in a reasonably careful manner, to make that translation.

I think your observation on the first question is the crucial one that really compromises the interpretation made by Dr. Ashford. It started out as a sample of the population. And because the purpose of the project was not to develop a national prevalence or even local prevalence, we purposely biased the sampling in stage two of the project. Stage one was a sampling and that was the environmental portion of the work. But we purposely, in order to optimize the occupational disease cases we would confront the physicians with, gave the physicians biased samples of workers that had the highest exposure. So one cannot take data from biased samples and apply it to the general population. Now this can work backward and you can play some games, but there are only 900 or so people, and we are not about to play games like that.

I do agree with Dr. Ashford that I was surprised at the number of occupational diseases we found, but on the other hand I don't think it can be blown up to any figure like 24 percent or the like.

Chairman BUNN. Thank you. I think that concludes the first part of the session. We will now have a coffee break that will terminate at 10:40, and please be back on time. I don't want any members of the advisory group or panel to miss any opportunity for their questions.

[Whereupon the coffee break was taken.]

Dr. FINKLEA. We will now proceed to the roundtable part of the discussion and will entertain those who want to make comments or ask questions. I hope Dr. Dinman will lead off the discussion.

Dr. DINMAN. Thank you, Dr. Finklea.

There are two points I wish to make. First, this conference is part of an activity mandated by the Congress by its enactment of the Occupational Safety and Health Act of 1970. As such, the proceedings of this conference are to be recorded and ultimately considered in the proposal and revision of legislation governing workers' compensation.

If this conference is to represent a contribution in resolving the problems of workers' compensation, it must provide Congress with a perspective on this problem. To provide perspective requires that objects or events be presented from multiple viewpoints, so as to provide the mind's eye with a sense of the contours of the matter under consideration.

In the organization of this conference, several individuals have been chosen to present papers; several others have been selected to discuss these contributions. Considering the authors, it is quite clear from our previous encounters that they represent their own specific point of view. Their papers as prepared and presented will represent a significant body of the proceedings of this conference. But I would repeat, they must be understood as representing their own unique points of view.

It is obvious that the organizers of this conference recognize this reality. It is apparent from their choice of discussants. Accordingly, one would hope that the time and effort that went into construction of each of the prepared papers would be reflected, in terms of time and effort, in each of the discussant's presentations.

Without reflecting on the effort of the discussants, it is quite apparent that the time available to these discussants for review and unhurried consideration of each of these papers has hardly been adequate. I have polled several of the discussants and find as of last Friday, February 6, the following:

The Ashford paper was available to discussants on February 3; barely a week ago. The Selikoff was not available to discussants as of February 6. The Mancuso paper, and by the way, it consists of 108 pages, was not available as of February 3.

It is quite clear that while Ashford, Selikoff, and Mancuso have been given weeks, if not months, to prepare their papers, that the discussants have been given 7 days or less or none, to have a considered response. It should also be self-evident that any perspective that might be offered by the discussants can be severely circumscribed by the time constraints that are placed upon them.

Accordingly, if the proceedings of the Conference are to be characterized as other than flat and two-dimensional, I would expect that the proceedings would indicate either one of two, or possibly both, things:

(1) The discussants should be given the time and opportunity to prepare and write a critical review of the paper they are to discuss for these proceedings, and/or

(2) The proceedings should indicate for all future readers that the discussants were not given the time or opportunity to review these papers and that, accordingly, the prepared papers represent single viewpoints of the problem under consideration—in sum, an incomplete view of reality.

I expect that the record will so indicate the foregoing.

The second point I wish to make is in regard to Mr. Ashford's paper.

As I reviewed this paper, I have tried to constantly keep in mind the advice of St. Paul which was directed toward the inhabitants of Corinth. In Corinthians II, chapter XIII, Paul debates at length on charity, and concludes in verse 13, "And now abideth faith, hope, charity, these three; but the greatest of these is charity."

And so, it is with charity that I consider that Mr. Ashford, lacking insight into an understanding of medicine and biology, perceives reality in one dimension—a dimension that is oblivious to the perspectives these disciplines may bring to perception of reality.

First off, he ignores, or is ignorant of, the biological fact that man's constitutional endowment determines man's resistance or vulnerability to all disease states. He gives little credence to the reality that man's individual genetic endowment inexorably operates over man's entire life span, and plays a major role in determining his life experience, his health and disease experience, and ultimately determines in large part both the time of and the manner in which he will die.

Second, Mr. Ashford has chosen to ignore, or is ignorant of, a vast body of medical-biological literature dealing with the effects of social-psychological stress upon man's health and well-being.

Briefly, one might refer to the work of R. H. Rahe, which deals with life changes and their impact on health status. This investigator, and Romo in Helsinki, Theorell in Stockholm, Matsuda in Japan, Komaroff and Holmes in dealing with Negroes and Mexican Americans, and Howard et al. in dealing with native Hawaiians—all have collaboratively developed scales of life events and correlated these with sickness occurrence.

These cross-cultural studies have clearly demonstrated that family events, for example, death, marriage, divorce, health, and 14 other changes; personal events, for example, jail detention, sexual difficulties, death of a close friend, and 14 other events; work events, for example, being fired, retirement and 5 other changes; and financial events, for example, major change in financial state, mortgage or loan over \$10,000, and two other events; all can be scaled and related to the precipitation of changes in health, independent of the cultural setting in which the study subjects found themselves.

Although Mr. Ashford *inter alia* indicates awareness of the fact that these other factors may be operative, the weight of this discussion focuses on work-associated factors in disease causality. It is to contribute some balance to this discussion that I feel impelled to interject these considerations.

Indeed, it is because of the purpose of this conference that I believe it is important that the record show that other social-psychological realities are significant determinants of disease and disability.

These realities of our culture play a role in precipitation of arteriosclerotic cardiovascular disease, Rahe et al., 1974; hypertension, Harburg et al.; accidents, Selzer; and diabetes, among other disease states.

To leave a record that implies that work alone, or in the main, is a determinant of disease and disability, is a monocular view; one lacking in perspective and leading to a distorted view of reality.

It is not to chide Mr. Ashford that I make these comments. Simply because these proceedings are directed toward elucidating problems in

disease causality and workers' compensation, I believe it important, and self-evident, that this more balanced view of reality be made a part of the record. Certainly, if it is society's decision that the cost of disease and death be internalized as a cost of production or doing business, society should be made clearly aware of the implications and allocational inappropriateness of such decisions.

And for the sake of Mr. Ashford or anyone else, I have a list of bibliographies which deal with this subject, and I will be glad to make them available for the record.

Chairman BUNN. Just a moment; let me interrupt. There are a couple points raised, which I think possibly, only I can respond to.

No. 1 was the question as to whether or not there were going to be any formal papers in response to the principal papers, the presented papers, and the answer to that is, that it is not contemplated. However, if anyone wishes to prepare a formal response for the record to be presented to the Task Force, we will be pleased to receive such.

Second, to clear up the type of task force this is: This is not a congressional task force. It is a Presidential task force.

And insofar as the time for responding to the principal papers, I think that that has gotten into the record by virtue of the comments that Dr. Dinman made, and Dr. Dinman is the medical director for ALCOA, and we appreciate it very much.

And at this point, I will turn the mike back over to the moderator.

Dr. FINKLEA. Thank you for some moderating comments.

Mr. Samuels.

Mr. SAMUELS. Dr. Dinman's substantive criticism is of interest from several points of view, particularly since he quotes Corinthians and charges that Dr. Ashford is ignorant of medicine and biology.

The Corinthians knew, but Dr. Dinman apparently does not, that there are severe limitations to "man's constitutional endowment." Even though part of that endowment is "genetic," the Corinthians knew, and latter-day biologists have confirmed, and Dr. Dinman never learned, that the machinery of any body has limits in its ability to continually adjust. More, the Corinthians knew, but Dr. Dinman cannot perceive, that change from well-being to disease is epigenetic yet continuously affected by new and often external influences of the kind described by Dr. Ashford.

Now if Dr. Ashford has not been precise enough to account for all that universe from which the factors of biological change are drawn, or even if he has difficulty in drawing conclusions from such factors, then I would hope that Dr. Dinman is aware of another concept of which the Corinthians were aware: namely that conclusions cannot be more precise than the premises from which they are drawn. In this world garbage enters our calculations, because mostly garbage is available, and thus it comes as no surprise that many of our answers are garbage. This most of us uneasily tolerate. But to make it a point of criticism from one who is consciously involved in the generation of statistical garbage, through the sponsorship of garbage studies, destroys hope, abandons charity and is beyond the realm of faith.

I would suggest, Dr. Dinman, that you reread Corinthians, as well as the Aristotle, Plato, and Theophrastus which they read, and supplement that regime with modern readings from the same vein: Carlson, Cannon and Dubos. I will supply you with a bibliography.

Dr. FINKLEA. Thank you. I must say we are not having a conference on solid waste. I think you and I both have worked in that area in the past.

Dr. ASHFORD. It is with great hesitancy that I dignify Dr. Dinman's remarks with any response. My assigned task at this conference was to articulate the relevant issues important for understanding the possible magnitude of the occupational disease problem, not to engage in a discourse on diseases in general medicine, biology, anatomy, neurophysiology, and genetic theory. Dr. Dinman distracts us from the real purpose of this conference—what the workers' compensation system can or should do about occupational disease. I have been deliberately careful in my prepared remarks to avoid sweeping generalities and exaggerations. Certainly "a possibility that 5 percent of heart disease, cancer, and respiratory diseases could be of occupational origin"—representing 6,000 deaths annually—should not violate our sensibilities. It is curious that Dr. Dinman in his discussion of stress left out the important work of Dr. Lennart Levi at the Swedish Karolinska Institute. Levi feels that the greatest stress the worker is subjected to is noise and piecework. The stresses are of different origin in response to different kinds of amelioration. In one case, job redesign and in the other case, industrial hygiene. Aside from the direct harm caused by stress, the toxicity of many materials is enhanced when found in combination with stressors such as noise or heat. These materials are found primarily in the work environment and hence, the problems of stress are compounded there in contrast to the stress found in nonoccupational environments.

I would like to focus our comments and attention on the three questions which we were endeavoring to answer. I think we all agree honest people can disagree about the magnitude of our problem and what should be done. I would like for us to go back and think about the definition that Nick gave, and Phil Enterline more or less agreed with, or more definitely agreed with. And to think again about what Dr. Discher said before we had our coffeebreak of what we might do with the system we have in place.

I would like to focus on some of the mechanisms we have and could improve to better define the magnitude of the problem.

I didn't take up my 5 minutes at the beginning, I thought I might need it later.

Dr. SELIKOFF. I would like to answer the questions Mr. Bunn asked at the outset, and as you say, perhaps we might well look first at the definitions, because if that isn't clear the rest is quicksand.

I would like to read the definitions that Dr. Ashford has given because, as has been suggested, it has not been contradicted by his ill-prepared discussants.

I would suggest that the definition of occupational disease, include diseases which are solely or partially caused by occupational factors, and it goes on to say, it reads, "the workers' physical and mental well-being which may often occur after he leaves the work force."

I am wondering what would our legal colleagues say if Dr. Ashford stopped at the word factors? I would suggest, those diseases caused solely or partially by occupational factors. Because then we have opened up a whole new area for discussion.

In other words, is workers' compensation, payment for disease that is occupational in origin, or is it the same as payment to a worker for a disease derived from the workplace?

Now I suspect that this unclear dimension, or one that has been clear in the past but I think is becoming less clear in the future, underlies the exchange between Dr. Enterline and Dr. Ashford on the interrelationships between occupational and environmental disease. Because, these interrelationships as a practical matter are now becoming quite important.

We had our first hint of this back as far as 1935 when Dr. Schwartz reported on the wife and child of a P.C.B. worker. And in the late forties our colleagues were reporting beryllium, a finding of fatal beryllium lung disease among wives of beryllium workers, as well as people living about their plants. And it is well known that with asbestos, we are now finding a great deal of fatal and disabling disease among family contacts with asbestos workers and people living around asbestos plants.

What about these bystander diseases? People who are themselves not working with an agent which is toxic, but simply working in the same industry. These 4 million workers in the construction industry, for example, who themselves may not be working with asbestos, but certainly work in the industry in which two-thirds of all asbestos is used. Or the chemical industry, where it was recently found 40 percent of the workers are actually chemical operators, and 25 or 30 percent are maintenance workers, carpenters, and so forth. So that we are dealing with now an area the boundaries of which are not quite as clear as they previously were thought to be.

I would like to address myself to the second question. How can OSHA, the Bureau of Labor Statistics, NIOSH and other agencies, cooperate in the development and collection and analysis of data? Well, if they aren't doing it so far. I don't know what we are going to tell them to do. I am sure that John Finklea is thinking about this as well as Mort Corn.

How can we develop better estimates of disease? It is no great trick to do. Take three or four specific diseases. Asbestos, where the Public Health Service has calculated there are now 1 million current or former workers who regularly work with asbestos. It would be simple enough to do the appropriate surveys to make the analysis for estimates of the prevalence of disease, or if you like, mortality and morbidity.

We have known about silicosis for 50 years. Marcus Key, I think is in the room; Mark suggested 5 years ago it might be a darn good idea to do a survey to see how much silicosis there is in the United States. He published this in a paper and so far nothing has been done. Here is a disease that has been with us a very long time and nobody has gone back in the mines and other areas where silicosis-producing substances are used to find the incidence of something that is well before us.

Take lead. Lead is perhaps the first disease for which recognition was given. This came up 100 years ago and NIOSH and OSHA cannot tell us today how much lead disease there is in the United States. It would be no trick to do a survey to see how much lead disease there was among lead-exposed workers in the United States.

We know what to do to go from substance to disease. Let's say we don't want to do it that way. We have a number of other methods and now Dave may be interested in methodology. And we have some very good methods. We have never used them. We had hints about them first of all more than 10 years ago when Tom Mancuso published a paper on how the social security system has already recorded within it the outcome of occupational exposures.

The recording began in 1948. We have never explored the social security system. Phil used it from time to time. Tom actually demonstrated its usefulness. The answers are already in that system and they have not been drawn out except for a few places here and there.

There are many other examples. Now I would like to turn to our colleagues in the insurance business. There are in your files hints, leads about reported disease or deaths or disability associated with certain occupations. I am wondering whether the Freedom of Information Act might even extend to your records for us to get some leads on what you know in terms of human disease in relation to what now can be done.

There are data. There are ways of going at such things. There are morbidity data that can be useful and we are simply not looking to them. There is much that can be done. I am afraid if it is done we will have to have another conference to find where to get the money to pay for all this.

Dr. FINKLEA. Thank you. And perhaps, one outcome of the conference would be that we were able to have a little better information for the next conference some years hence.

I have these comments about Dr. Ashford's paper. Aside from the biologic problems that Dr. Dinman referred to, I think Dr. Ashford has made a contribution to the knowledge.

There are two references in here which I had no knowledge of, and that is the Serles reference, and Taylor and Rosen. I would very much like to get those so I can review them. I had not known about them.

Also, I thought the analysis you made of the three leading causes of death in terms of occupational contribution was a novel approach. And perhaps NIOSH should officially call in the Heart and Lung Institute and the Cancer Institute for their best guess as to the occupational contribution toward these diseases.

There are some statistics referred to in the paper on page—on the bottom on page 3: A 1965 reference to 336,000 cases of O.D. in the United States and it is mentioned this is based on the California first report of work injury, projected to the United States as a whole, based on comparable S.I.C. codes.

The figure on page 4 attributed to the Public Health Service of 390 new cases is exactly the same mechanism. It was just made a few years later and the count in California had gone up.

The 100,000 deaths each year as a result of occupational disease first appeared in the 1972 President's Report on Occupational Safety and Health. The basis for this was explained in the report. It was, the statistics were done by Joe Wagner, and was based on excesses of deaths in certain industries, including mining.

I thought a much better basis could be found for this estimate and in response to Wayne Brooks' repeated criticism of that figure, Bill Lloyd in NIOSH has come up with a somewhat better justification

for that. But as time goes on, it looks like we may have come pretty close to the figure, at least in an order of magnitude.

I hope, Dr. Ashford, in your final revised paper you will use the latest BLS figures. It seems a shame to use the 1972 figures when there are more recent ones available.

Finally, I would like to make a comment about the definition of occupational disease. There is a danger in expanding this definition of occupational disease to the point of absurdity. That of compensating for a small percent of occupational causation. With finite resources we run the risk of shortchanging those with bona fide work injuries. And with occupational diseases that are clearly of occupational origin.

Perhaps we should amend the definition to qualify somehow the words "partly caused." Maybe "more than 50 percent," or "caused in the majority by," but please don't pin me down as to how to define this.

Thank you.

Dr. FINKLEA. Thank you. We might try to get to some members of the panel now.

Mr. MAZZOCCHI. I would like to mention one thing—and they are not being used—that is the third-party-payer information which immediately could be used if a very simple change were made in the claim forms of all third party payers that would list occupation and job classification, and of course, require third party payers to maintain that information. They are destroyed within a short time, 3 years and 5 years being the outside time. That very valuable information that really allows one to draw some statistical data is lost.

Also, I still do not understand why a cancer registry does not exist in the United States. That would allow cancer to have a formula for which a registry could be developed. I know there are all sorts of voluntary registries, but from my own glimpse of those registries by State, it would lead me to believe they are not valuable sources of information for this purpose.

The National Cancer Registry would also require, that the lifework history be entered, so one doesn't look at the last job held, but of the total work history. And that is certainly essential in identifying cancer related to occupational disease.

Dr. Enterline talks about insurance company statistics which are available. I would not absolutely trust all mortality data out of insurance companies, certainly because the cause of death many times is not recorded. Again, the last occupation is listed. It is not for the most part a good source in my own experience about what those mortality data would show.

I think between those two simple moves we would begin to see immediately what is occurring at a workplace. And it would also be imperative that it would develop to make third party payers, after all which is a deferred wage for a worker, the third party payer would, based on data they themselves see, force more cases into workers' compensation. That would be, of course, and certainly be a day-to-day thing to provide expertise to define the true cause of a disease.

The way the system operates now is that, in the 25 years I have been in the labor movement and representing people, I only remember winning two cases of occupational disease. The question of being over-compensated is a negative factor.

Most disease, as Dr. Ashford pointed out, goes undetected and it is very difficult to develop who caused what.

So, the third party payer is an immediate source and I keep pressing that because this is something that can be done tomorrow morning and not by-and-by.

Dr. FINKLEA. Any other questions? Mr. Halpern.

Dr. HALPERN. I would like to discuss the issue of the scope of the problem. In two separate places the issue of mental illness is dealt with. I think people should be very, very careful about first of all how one would define mental illness, whether it would include circumstances included in alcoholism, and the entire issue of mental illness, and relating it to occupational factors. It is so difficult to trace back the cause of a physical illness to an occupational factor, and I think we would probably be in more trouble with mental illness.

I think we know that various stresses can cause psychosomatic illnesses which are very real and psychosomatic illnesses resulting in such specific things as ulcers, and I think if workers' compensation were expanded, and the cause of occupational diseases were redefined to include mental illness, I think you would be dealing with a potential of a program so large in scope it would be totally unmanageable. I think somebody should give some serious thought to whether or not mental illness should be included in occupational disease.

Dr. FINKLEA. Thank you. Mr. Kalmykow?

Mr. KALMYKOW. I must express agreement with a good deal of the remarks that have been made, but I would make this observation: I think it is a little early to try to define occupational disease in the first half hour of our discussion. I think the remarks of Dr. Mancuso and Dr. Key and Dr. Halpern have made are very pertinent, but I think maybe we should defer that. I do want to remain silent on that until we get more input, but I don't want to be precluded from contributing to possibly that aspect somewhat later.

The other thing is, another point that is so extremely important, is the area; the problem we are talking about to some extent depends on definitions. In the second place, it is based on a lack of information. I think maybe we have the tip of the iceberg, but the figures indicated here are to some extent, I am afraid, based on a conjectural figure or hypothesis. It may turn out to be correct, but I have not been convinced it is any more than that, conjecture, and certainly we want to know what the story is.

I think it is more important to see that the workers who are actually injured from known hazards do get compensated, are taken care of. If we accomplish that, I think this conference will accomplish a great deal.

Dr. FINKLEA. Thank you. Mr. Burton?

Dr. BURTON. So far as getting to a question of occupational disease, I guess I go along basically, but if you go to an area like heart disease, and trace this ultimately to other factors that precipitate heart attacks, heart disease. I am struck with the fact you ought to define environmental disease "any disease caused solely or partially by environmental factors." Then also you ought to define hereditary disease, which is caused solely or partially by hereditary problems.

For many instances of heart disease you would have to address three different kinds of diseases. In a sense, that is pretty obvious, and no

great step forward in your paper. I think it means we have to be careful using the data on occupational disease because in a certain sense there is an element of double coding. I think we can get something of a misleading picture about the sources of occupational disease problems.

Dr. FINKLEA. Thank you. Mr. Lewis?

Mr. LEWIS. I too have had some concern about the development of codes, and the more I listen today and the more I read some of the papers like Dr. Selikoff's paper my concern grows.

It appears we may in fact have to develop more than one definition depending on the purpose in mind. It is all right from my standpoint to cast a wide net in terms of occupational disease for purposes of dealing with disease problems and purposes of conferences like this. But, when we get down to the bottom line of assigning penalties for failure to eliminate a particular disease or a hazard from a particular workplace, or assigning the burden of medical and indemnity benefits that may be awarded as a result of a disease, it becomes more or less questionable whether you can use the same definition.

In reading through Dr. Selikoff's paper I noticed with interest some comments concerning interrelationships between cigarette smokers and certain diseases. I believe most would consider those occupational. I am perhaps overemphasizing the statistical findings, but he indicated if you take, for example, the incidence of bronchitis among coal miners in which it was indicated if they did not smoke cigarettes the incidence was no greater than the general population in the same community, but if they did smoke there was a significant increase in bronchitis. If I were fortunate enough to be a coal mine operator and had employees coming to me for workers' compensation benefits for bronchitis, which was really due to the fact they smoked, and if they didn't smoke they wouldn't have bronchitis, I might be a little concerned about paying the additional premium. Similarly, if society put work standards on my workplace, when in reality they should be doing something about cigarette smoking, I again would be concerned.

The more I see of these kinds of findings, the more I hear similar comments today about the interrelationships, the more insecure I feel about the ability of us to use one particular definition. And Dr. Key pointed out if we become too broad in the definition we may find ourselves to a great extent dealing with the minor problems and not having proper resources to allocate to very serious problems, of which we are all aware.

I would simply sum up my concerns here and say that we are still a long way from being able to develop a definition of occupational disease, and in fact, will not be able to do so until we determine why we are not able to define the disease problem itself.

Dr. FINKLEA. Doctor Mancuso?

Dr. MANCUSO. I should like to comment in reference to the geographic variation of cancer in various States and counties. I consider this to be very important and Dr. Enterline referred to it.

While there is a geographic variation in males and females and for black and white, the emphasis is on occupation as reflected in the marked excess of males versus females. There is definitely a much higher rate for males versus females of the same color in these counties. The excess for males must be due to the contribution of occupation. That is the most major difference that can be found. Both males

and females were exposed in the community; but in addition the males, for 8 hours of each day or more on weekdays, had a continuing exposure of inhalation of high-level dust fumes, mist, gases, and so forth.

The female rate for occupational cancer does exist. I am suggesting the occupational cancer risk may be much higher than presently realized because it takes a tremendous measure to influence the rate for a typical county. Where a county has a predominant type industry, then the county may reflect occupational cancer contributed by that industry.

But again, this may be a conservative estimate. The geographic variance pattern indicated by Dr. Ashford is very important and should be studied in greater depth.

My second point relates to the statistics mentioned. I would appreciate focus relative to the problem of developing data that goes with the statistics. It seems to me focus should be on the source of that data. One must look carefully at the accuracy and completeness of the data distribution.

The other point relates to the insurance industry which has been brought up by third party and other sources of information developed. I would like to throw this out for discussion and I have not prepared this until this moment relative to another idea, relative to the development of a third party approach to the ascertainment of patterns of illness.

If an industry is covered by Blue Cross and Blue Shield, then you can establish a means of identifying patterns of illness occurring for each particular occupational group in that particular industry. Instead of taking the total population which relates to the total population of the particular industry or plant, you break it down by counting beforehand the particular departments and occupation that department has. You would in effect be getting a morbidity pattern of the type of illness occurring in that particular industry. Of course, you would have to identify in this type of circumstance certain cumulative facts; so you identify his employer, his position, and so on and so forth.

What I am saying is there does exist some means to obtain and to know what is happening to the working population.

There is also the social security approach which I think we can discuss at some other time.

We must have an ongoing system of ascertaining whether a pattern of disease is different and the disability is different in a particular company or particular plant, and from that to go on, you can determine what might be the cause of it.

This is no different than what is being done in vital statistics where we provide demographic data. I think it is a way something could be done.

Dr. FINKLEA. Thank you, Doctor Amdur.

Dr. AMDUR. I am not entirely certain one can define occupational disease. I find it so much easier to define environmental disease. I would certainly suggest environmental disease, of course, would be a device to include any and all types of disease which may have in some instances some occupational contributions.

I would also add along with Dr. Mancuso's comment you must not ignore the relative contribution of disease for women or for men as being relatively unimportant. Certainly if you are talking about, for example, coronary artery disease, there is no comparison between men and women until women pass menopause, at which time the incidence is about the same.

The incidence of women in industry has gone from 18 to 28 percent in the last 5 years. It isn't going to make much difference whether you are talking about men or women, you are talking about the same exposure.

One last thing, the third party payer. As a practical matter, I think in many instances Blue Shield reports, and what is contained in them, is hardly worth recording as a device to assess whether or not the disability for which the Blue Shield is paying is occupationally related. I think the people that put the information on there do it as a matter of convenience.

There are many occupational diseases, occupationally related disability. And the attending physician, rather than going the workers' compensation route decides if it is filed under Blue Shield there will be no problem, and that he will be paid promptly from Blue Shield without the matter of hassling, he will indicate he was disabled from outside of his employment. I don't think Blue Shield is the device for getting the additional information we are talking about.

Dr. FINKLEA. Doctor Corn?

Dr. CORN. I have a question. If, as is being said, there is a terrible shortage of physicians able to diagnose the problem so that the initial data coming in will provide a work base for any statistical format developed, what is the reaction in terms of improving? How can better data be developed immediately through a massive, intensive program of pilot studies of S.I.C. classifications that would give us a basis for sealing up the magnitude of the problem from small pilot studies?

As an example, some of the material on my desk at this point are economic impacts of certain agents in 68 S.I.C. classifications. Maybe we should have 68 intensive pilot studies of the estimates of occupational disease in those same classifications—could I have a response to that?

Dr. FINKLEA. Any comments from the panel?

Dr. SELIKOFF. I am not as pessimistic as Dr. Amdur. I think I would rather channel my ideas with Tony's. I think the third party payer and the insurance businesses can give us a great deal of immediate information in the next year or two. It is possible for us to get some leads by selection of material that will, that tends to be accurate and I mean there are many inaccurate ones at the same time. If we even knew which doctors were being paid for a diagnosis of acute hepatitis, we may learn a good deal about many effects of the chemical industry, for example.

I think we are constantly moving toward that and we can use systems that are already in operation, and effectively in operation, to obtain early warning systems to obtain morbidity data that would be useful.

I would like to refer to one thing that Tom said about the insurance industry. There is in our history in the United States a little-known

fact. In 1929 the Metropolitan Life Insurance Co. began a study of a large number of asbestos workers. It went on to 1931. Not a word was said about the result of these studies until after the Pennsylvania State Health Department reported the study in 1935 and at that point a report was made.

We would have saved 5 years of intensive exposure because there were no controls at that time, and much of the disease we are seeing now is related to the very excessive asbestosis in the early thirties. And yet, that data was utilized, if at all, by insurance companies perhaps to calculate their rates. I don't know. You are entitled to that, but by the same token the Government scientist and the American worker is also entitled to know the results of this kind of information because it relates directly to the subject under discussion, that is, prevention of occupational disease.

Dr. FINKLEA. Thank you, Mr. Mazzocchi?

Mr. MAZZOCCHI. The right to know. I would always suggest before any employer be eligible to insure himself of workers' compensation that the right to know, that is the employee be aware of the substances that he works with. This is a condition that does not exist in the workplace that would demand identification of all substances by the generic name, one, that would indicate that substance exists, measure the toxicity in the workplace, and whether there is monitoring in the workplace. I think if you establish that you start narrowing the problem down.

Very immediately people for the first time become aware of the toxicity of substances they deal with. You are able to make the necessary correlations. You are able to deal with the questions of potential risk that exist.

No one knows yet what one works with. The burden of proof is on a victim that knows nothing about his own environment. Therefore, when he goes to his personal doctor, I have no fear that the doctor will speculate on the forms because the personal physician knows nothing about occupational disease. He could not even begin to understand the type of environment the person he sees comes out of. He may know he works at XYZ factor, but he assumes like Dr. Enterline mentioned, that things are better. I think we are worse off than we were because we are working with different substances. There are wide gaps in knowledge and one then, of course, can't begin to identify the scope of occupational disease.

I want to make another comment on cigarette smoking. Homicide and suicide are socially acceptable; are socially acceptable so far as the cigarette industry goes. When something is socially acceptable, you can't change the ground rules. When the worker walks into the workplace, we say you can smoke—you have free choice. Society allows the promotion of smoking. The employer's responsibility is to comply with the law. The law says the workplace shall be free of any hazards, and that is the essential characteristic.

If a coal miner chooses to smoke that is his choice. That doesn't mean he should run an extra risk when he enters the coal mine. If we feel one should not smoke, we should outlaw the cigarette industry and make smoking a criminal offense.

I think the whole smoking question has to be put into proper perspective in the question of worker's compensation.

Dr. FINKLEA. Judge Novicoff?

Judge NOVICOFF. One comment in Dr. Ashford's paper causes me some concern when he says that, and I will find it, that present workers' compensation costs do not include occupational disease. Now, the only way he can make that statement flat out is by just saying that a lot of occupational disease cases are unknown—are never reported—or turned down when they are reported. And to some extent, that may be true.

It is a problem I think we all recognize. I would question the magnitude he puts on it, because we simply don't know.

Which leads to my second point, that is, I think a great need as I see it is for much more meaningful statistics to be developed. I think that the one—there have been several suggestions—I think they are all good. I don't think we have to pick just one.

I will talk a moment about Dr. Discher's idea of going into the States and getting statistics from workers' compensation which, after all, is the place it is supposed to be.

Dr. Discher, I think you will find it different from what it was 5 years ago or 3 years ago. Many States are keeping many more statistics. I think you will find that there will be much more cooperation than you expected and although I don't speak for the other 49, I can promise you the cooperation of my State.

I have another comment about cigarette smoking. I think it is true in respiratory diseases and I think we are all aware of it, that cigarette smoking can and does contribute to lung cancer and other respiratory diseases. Obviously, unless we pass a law and say nobody can smoke, people are going to smoke. And an employee has the right to smoke.

But then, we get to the bottom line of who is going to pay the cost of that respiratory disease if it is caused by smoking, and that is the problem. Are you going to ignore it and say simply because an individual smokes when he comes in contact with what may or may not cause respiratory disease, therefore he is entitled to be compensated? That is where I part company with the statement made that he has a right to smoke. And therefore, if he gets respiratory disease and the indications are if you look at the workers in that industry there are more incidences of respiratory disease if you smoke than there are if you do not, and therefore he can't get it. I don't following that logic.

Dr. FINKLEA. I will have to cut in. We will have to move to audience participation. Is there anyone in the audience who wishes to participate?

Mr. BROOK. I am struck with the very first sentence Dr. Ashford opened with, when he said that lawyers, statisticians, economists, and doctors have different rules of evidence. I think workers' compensation brings to play all of those laws of evidence and it ill-behooves each of us to be a little distressed with the other because we are all moving into an area that is rather dim and blurred.

How do we respond today in damages or tort to something we have to say we won't know definitely about 20 years from now.

The workers' compensation system is asked to undertake, which was a traumatic injury system, the compensation—and I use that word advisedly—for a scientific discovery which has outdistanced our mechanism. We have difficulty recognizing the future until it is part of the present, and that may be what we are discussing now.

Dr. FINKLEA. Thank you, Doctor Rose?

Dr. ROSE. I am with NIOSH. I would like to make two quick points in response to Dr. Corn's question. Would it be possible to do the type studies he talked about in a number of industries and occupations and try to get a quick estimate on what the magnitude of the problem is? I think it would be an appropriate thing to undertake something on the original design of the disease studies established in 1970 through 1971 by NIOSH. It is the exact thing we had in mind at that time.

The second point I would like to make concerns what appears to be the use of workers' compensation data to really estimate our total problem of occupational health or scope of that whole problem.

It seems to me workers' compensation data usually are a yes-and-no type of determination. It is, or it isn't.

While what, in most cases what we need to know is, with the level of sophistication we have now concerning diagnosis of occupational disease, is to be able to put in a number of categories probabilities where there might be contributing factors that go along with the disease condition as manifested. The World Health Organization in their document, "Early Detection of Health Impairment in Occupational Exposure to Health Hazards" (1975)—identifies four categories that one might place a disease condition into as to whether or not it is totally developed from totally occupational considerations or whether there was some contributing factor, and this might be one way of expanding our knowledge.

Dr. FINKLEA. Other questions from the audience?

Mr. CLARK. Howard Clark—in connection with our agonizing over the definition of occupational disease, I am wondering if we are not prone, when we narrow definitions, to bring into play such themes as proximate cause or predominant cause.

Do we not exacerbate the adversary nature of the system, particularly in the light of the fact you have something that is not so readily identifiable as the accidental injury. I think this is one of the clarifications we must have if we envelop more occupational disease into this system, and if we refine the definition of what we are going to envelop in this system.

The second observation or comment I would have is in connection with these diseases that may be identifiable with a particular industry. I am reminded you never see a life insurance—I don't recall any difference in rate in connection with several different industries. I am reminded also whereas we used to have industrial life insurance or debit life insurance, the insurance companies are moving away from that. It is not really as predominant even in the industrial area, the difference in the rather sizably higher rates. The higher rate structure for industrial insurance is predicated upon the higher expense requirements.

Chairman BUNN. Excuse me a moment. [Pause.]

Mr. CLARK. I was commenting that industrial or debit life insurance companies are losing control or intentionally removing themselves from the field.

I think perhaps we may be somewhat overly sanguine as to the availability of data from insurance companies. I suspect, as we recently found to our horror in the medical malpractice field, the data were non-existent.

DR. FINKLEA. Other questions from the audience?

MR. GOLONKA. Golonka, Bureau of Labor Statistics.

Several points I would like to make. It is important in reading the Discher report and the comments by Dr. Ashford that we keep in mind there is a distinction between prevalence and incidence. The BLS system today in effect measures the incidence rate of any occupational illness and injury.

You are in Dr. Discher's report talking about prevalence. Included in his measures are conditions whose origin may go back in time prior to the period of reference.

The recognition of the occupational disease is the most serious problem we are faced with. If recognized and recorded the Bureau of Labor Statistics will collect and report it. Until a major effort is made at the front end, I think the approach to illness recognition will primarily be an ad hoc operation as we have been discussing here.

DR. FINKLEA. Thank you.

MR. SCHUBERT. I would like to comment briefly on Dr. Ashford's definition of occupational disease. It is important to know we have to start with definition of occupational disease, but ultimately this definition has to be interpreted into something people can work with in the frame of the workers' compensation law. I think it is important to know, as Dr. Ashford said, essentially an occupational disease is one caused solely or partially by occupational factors. I think we have to say this is something that is due to the peculiar risk of a job, and not something that is due to a risk of the public at large. Otherwise, we may tend to include such things as the common cold and arthritis and many other items that are patently not occupational but environmental in origin.

But, unless that definition is more confined, there will be a tendency to draw many of these environmental factors directly into the occupational scheme, and this is going to increase your litigation in the system and this is something we do not want.

We have many employees now that would like to say all those things that occur on the job therefore are related to the job. And if the individual has a common cold and says he got it from the person next to whom he sits, there are many employees who would like to make a claim based on that. Or that my arthritis was aggravated on the job, when none of us accept arthritis as an occupational disease.

I think the definition is something that must be translated into something the law itself can live with and the practitioners in the field can also live with.

DR. FINKLEA. I think we have come to summation time. I would like to urge that the panel members continue this discussion at a later time in the day, and there may be further input the chairman or members of the panel may want to put in the record on this matter.

I would like to move briefly to trying to address the three points which we were assigned at the beginning of the day—well, we were assigned them some time ago.

I think we were asked first of all to come up with a definition of a problem and Dr. Ashford tried to address this matter.

There was a good deal—in summarizing the results of our discussion—I think there was a good deal of agreement with parts of his

definition. At least to the extent we say occupational disease includes those diseases caused solely or partially by occupational factors. There was a great deal of concern on how to define partially. This was based on several concerns. On the one hand, a number of commentators felt the partially had to be largely. On the other hand, some of the others felt subdividing causality would greatly increase the litigiousness of the system and cause further difficulty.

I don't think we did arrive at a unanimous definition of disease, but I think by and large we agreed the definition advanced by Ashford was a place to depart from.

There was also great concern that this definition could not be applied in the workers' compensation field until it was translated into a definition that could be utilized legally and we certainly have not been able to do that this morning.

I think further discussion focused on the necessity of having other decision mechanism to make this translation—which there was a great deal of disagreement about.

I would like to move to the second question: "What quantitative measures or estimates are available to indicate the extent and characteristics of the problem?"

Dr. Ashford presented a view. I think in general people felt the range of his estimate might be appropriate. There were at least two major cautions when viewing this estimate. One was the estimate was derived from residuals, in a number of common disorders, and these residuals could also be attributed to a number of other factors including environmental disease.

There was no unanimity we should combine occupational and environmental disease at this time.

I would also like to point out here there was some disagreement that the estimate might overstate the case by a small minority of those who made comment on this question.

In general, though, I think most did agree occupational disease constituted a large problem, only partially defined at the present time, and certainly not well compensated.

Moving to the third question of how better data could be developed immediately and in future years, we had much less agreement. I think it would be fair to state that the panelists and audience felt that most of the approaches that Dr. Ashford outlined in his paper were worthy of further investigation, but there was no unanimity that any single approach would yield the information which is required.

I think specifically it was urged the Federal agencies involved certainly take a hard look at what could be done with existing social security mechanisms to further define the problem. Dr. Discher commented on several approaches that might be helpful. He felt that use of the worker's compensation system information in many of the better States might be a point of departure that could be utilized. He also commented on the use of a survey technique.

Mr. Golonka pointed out the survey technique as expounded by Dr. Discher would differ from the system now in place in the Bureau of Labor Statistics which focuses on the incidence rather than prevalence.

There was a great deal of talk about the insurance industry and for a while there I thought the Federal agencies and insurance in-

dustries should be industries studied for their defects. There was certainly no unanimity that the insurance information would in fact be helpful. Although I think it was agreed that the complete scope of this information should be explored in more open fashion than apparently it has been in the past.

I would like to move on to the last question which was something about what we can do immediately and what we could do in the next 3 to 7 years. There was some sympathy for an immediate look at a number of the industries, either by standard industrial classification, or by some other mechanism to assign priorities to industries that should be studied. This was not unanimously agreed upon.

We will close on that quick summary which we might need to refine as we discuss this during lunch.

I think we also discussed garbage, religion, and a number of other factors, and we arrived at less forceful conclusions about those matters, but maybe somewhat more humorous ones.

[Whereupon general announcements were made by Chairman Bunn and the luncheon recess was taken.]

AFTERNOON SESSION

Chairman BUNN. Before we get into the afternoon session there are several other comments I would like to make before we proceed to the formal agenda.

There is one person that spent a great deal of time working with the Task Force, Dr. Lorin Kerr, the medical director for the United Mine Workers. He is not able to be here due to the serious illness of his wife. I want to note for the record he was of great assistance in the planning process and we regret he is unable to attend.

There is also an unsung hero in every proceeding of this type. Someone that has just entered into the process. And I, having been a judge in times gone by, know very much about the fact that they are often overlooked. That is the court reporter sitting off to my left, Mrs. Patricia Sullivan, and it may be necessary that we take a break because she is a court reporter taking all this down in shorthand. I am sure this is a tremendous undertaking on her part, and we appreciate it very much.

I would also like to recognize in the planning process and in particular the office proceedings, the work done by the members of our staff in looking at the various definitions of occupational disease, which we touched on this morning, and looking at the various ways medical determinations are handled in various states.

I would also like to thank Mr. Jim Kmetz of our staff who prepared a rather interesting summary of the various approaches in the States.

And finally, or not finally, but before I get to the last item, one of the ladies I have to recognize, who has worked very diligently and is up at the main registration desk, and I am sure you have seen her coming in and out of the session. That is Mrs. Gerri Minor.

The last item is by way of recognition of the various people on the staff of the task force in the Washington office as well as the field people who have been working with this project in the area of technical assistance and gathering research data that is related to occupational

disease. They are here and I would like the people on the staff of the task force, as well as the field people, to stand for a second and then be seated. [Pause.] Thank you.

Now we will get into the program and I will hand it over to Dr. Roberts.

Dr. ROBERTS. Good afternoon. Probably everybody in the room has about 413 things he is burning to say about this morning's program. But, we should push on and light into the topic we have for this afternoon.

By way of introduction, even though it is slightly repetitious perhaps, I would like to read through the charge we have this afternoon as it developed through about four changes that were distributed to the committee planning this conference. Because, I think it would be good to keep this in mind as we hear Dr. Selikoff and Dr. Mancuso and the people that discuss their papers. And, if we direct particularly our interpretation of what they have to offer and maybe our own comments to the subjects, the session should be more profitable.

First, it was summarized simply this afternoon as a session which would deal with the problems and methods of relating a disease to a work experience. That is pretty simple as a sample of what we are going to talk about: the problems and methods of relating a disease to a work experience.

In a more elaborate and later version it came out this way: to focus on how the decision is to be made whether or not and to what extent a worker's disability is related to work. What evidence is required, what research is needed, and how and by whom and when this research should be done.

The second last version becomes more organized and elaborate, but essentially it suggested we are going to deal with how medical decisions ought to be made as to whether or not and to what extent a worker's disease or illness is related to work.

Then it goes on to specify we better light into questions of multiple-factor interactions. It suggests we use illustrative problem diseases for developing a subject. That we deal with medical monitoring, record-keeping and reporting of hazard exposures. And that we talk to the subject of medical basis for guidelines and presumptions.

Further, something about how these diseases are handled in private practice and try to order some priorities and improvements and to deal specifically in that effort with the role of the public and of the private sector.

I don't know how many of you have the last version, the one we, I guess, are to use as our guide now. It has maneuvered itself into being worded in terms more familiar to those who have dealt with worker's compensation matters in the past. The introductory statement of the challenge is still, I think, fundamentally the same as the first version we were given:

What information is needed and how can it be obtained to determine more accurately if a disease was partly or totally caused by the work environment.

We have a number of subtitles, but that is in essence what we are dealing with.

Our first paper this afternoon will be given by Dr. Irving Selikoff, director of the Environmental Science Laboratory at Mount Sinai in

New York, on the subject of multiple factor interactions in the causation of occupational disease.

Dr. Selikoff?

Dr. SELIKOFF. Thank you very much, Norb.

In the setting of standards for permissible exposures to agents which might cause occupational disease, there is acknowledgment that there is no necessary uniformity of response. This is reflected in the inclusion of safety factors in calculating such standards. In the past decade observations have been made which suggest that this precaution albeit correct, is inadequate, meager and conceptually much too narrow.

The complexity of the work environment and the workers' response to toxic substances, are much more varied than anticipated and consideration of occupational disease should include understanding of a wide spectrum of potential interactions.

And it is these I will address myself to in the next period.

First of all in the paper we have had the tacit example in many instances that for most occupational diseases there appears to be unquestioning acceptance of a one-cause-one-effect etiology. This has resulted in threshold limit value or maximum allowable concentrations or similar exposure standards being set for specific substances. There are TLV's for silica, vinyl chloride, beryllium, carbon monoxide, carbon tetrachloride, arsenic, and many other agents.

Now, this concept of one-cause-one-effect has been essentially a fertile one and helped establish much of our current knowledge. It has a history which may be worth revealing.

The first occupational agents or first agents that were clearly responsible for industrial diseases were discovered around 100 years ago in Great Britain; mercury and lead. They were quite specific in their effects.

At this time it was also known that dust, fumes and vapors could cause lung disease. It has been known since the early 16th century that dust could cause diseases of the lung and it could be fatal. But by the same token families in England working on the farms certainly had as long a life as everybody else in the country, while others, the Scottish coal miner for example, and remember these were the days before the pneumatic drill and the blasting cap, lived at least as long as most people in what the British called the social class.

It was not until 1915 that Collis, who at that time was the chief medical inspector of factories, clarified the situation by showing epidemiologically people exposed to silica, that particular dust, had much more TB than all other workers exposed to dust, and he for the first time clarified there could be a specific effect of a specific dust.

We were all very much impressed with this and this had the continuing effect of adding to the mercury and lead situation, giving us this one-cause-one-effect concept.

It was in line with the biological knowledge of the times, because at that time they were learning great lessons on infectious disease studies, where it was learned tuberculosis was due to the tubercle bacillus, diphtheria to the diphtheria bacillus, and scarlet fever to the streptococcus. And we learned, we were able to make great strides by learning the cause of an effect.

We have gone along in this very fruitful way ever since, and further we have been able to make strides in occupational medicine. That we, for example, we believe you can determine the biological potential of various metals, finding that some, as iron or tin, produced little pulmonary reaction while others, as beryllium gave serious disease.

And even today I think it is very useful to follow a substance in human environment so far as possible to study its effects and of course this technique is generally used in animal studies.

Nevertheless, and this will be the burden of my report—however well this concept served to this point, there is a growing feeling this is incomplete, restrictive, and occasionally even inappropriate and misleading.

The most important perhaps of the new information has been that in general there is in the work environment today concurrent exposure to multiple agents. Single agents in the work place are by far the exception rather than the rule. Multiple exposures are much more common. When they do occur, the effects can be varied, and often unpredictable.

I think it might be useful to take as an example toxic solvents. There may be more than one solvent and additive of nontoxic effect. And if they add numerous toxicants, they don't have the same effect. You can add more than one, two, three or four, and unless you know what is in the work place, and we rarely do, these can be confusing and difficult to interpret.

We recently had that with vinyl chloride. In our only study of vinyl chloride, we have found pulmonary disease. Is that due to vinyl chloride? By all means it might be due to vinyl chloride, but in any event there are a variety of additives, even polyvinyl chloride particles, and it could just as well be due to inhalation of such particles. There are numerous additives in vinyl chloride, additives, accelerants, et cetera, and very often pigments as well. So even in what we think is a single agent, it may not be so.

Coal mining is a good example. There are coal dust, diesel fumes, nitrous oxides, and there are variable amounts of sulfide dust.

We talk about lead smelters and we in fact have standards for lead and lead smelters. People employed in lead smelters are also exposed to arsenic and cadmium.

Therefore, it is obvious we know very little at this time about multiple exposure.

I need only mention inert particles—and we only use that term. I am not sure there is an inert particle—inert particles may absorb and potentiate noxious gases, as sulfur oxides and nitrous oxides, are carcinogenic materials. We know, too, the amount of so-called inert particle matter can have a major effect on the normal effective mechanism of the lungs. This has been one of the factors that has been proposed for discussion on coal workers' respiratory cases, why some miners catch a good deal of disease and others do not, and this is another area about which we know very little.

The second point I would like to make is that sometimes these multiple agents occur naturally. We don't have to put more than one agent into a work place. They may be present simply as a result of agents that are combined and variable.

Coal, I have mentioned coal. There is no such thing as coal. It is what we call coal, and it can be varied as to the mine from which it is derived, even from the seam in that mine.

Diatomaceous earth, we all know is usually of little trouble, and shouldn't give disease, but if you crystalize it, you get a good deal of disease. Then we not only have diatomaceous earth but tridymite and cristabolite present.

The solvents we are involved with in the work place, are labelled clearly solvents, but very often a solvent will have two, three, five times benzene, but it doesn't go by that name. There is no sign or label saying this contains benzene.

In recent years we have found that it is not only the chemical and physical nature of the material but, size and shape of the material as well. You can have the same material and vary it only in terms of its physical properties and have a different effect.

Now we come to an area of more recent development and of increased importance, and it was alluded to this morning; interaction of occupational and nonoccupational factors in the development of occupational disease.

Here we have all recognized for a long time that there are great variations among workers' responses to exposure in the work place. For example, not all miners get pneumoconiosis and not all sand-hogs get the bends. While some instances are known in which virtually all workers exposed to aromatic amines developed bladder cancer, this is unusual. More commonly exposure to occupational carcinogens will result in cancer in some individuals and not in others.

We have reported for example that among asbestos insulation workers 20 percent or more will die of lung cancer. That is another way of saying four out of five won't. We show that 5, 6 or 7 percent will die of mesothelioma, which means that 14 out of 15 won't. We have been doing prevalence studies of asbestos workers and found after 40 years of solid work 5 percent of the men have absolutely normal X-rays. So, there is an extraordinary difference, individual differences among workers in this regard.

Now, what these differences are due to we are just beginning to ferret out. We know just a bit now. There are sex differences for example. There is a whole question of difference in sex with lead, and this is going to trouble all of us with regard to workers' compensation and employment. Are we to set standards for a woman or man in the workplace with regard to lead? In the city just 3 months ago similar sex related variations in reaction have been identified for polychlorinated biphenyls.

The possible effects of infection have been pointed to for some time, and the recent identification of the importance of antitrypsin deficiency in the pathogenesis of some cases of emphysema, has attracted much needed attention to this field of research.

It has also been proposed that similar genetic defects may eventually explain lung cancer response among some people and not in others. Similarly, immunological responses, including autoimmune reactions, to pneumoconiotic dust have been proposed to explain fibrosis, as well as the occurrence of Goodpasture's syndrome following the inhalation of industrial solvents. Acquired allergy is commonly seen among

cement workers and those suffering from occupational asthma or extrinsic allergic alveolitis.

The interaction of the individual metabolic status and the work environment has also begun to be looked at. We all have been very much impressed with how little alcohol it takes for a person exposed to carbon tetrachloride to have rather severe liver reaction.

A variety of interactions between occupational agents and drugs taken by the worker are possible. An example would be the additive effect of sedatives and neurotoxic solvents. This may not be unimportant for a worker high on a scaffold at a construction site, for example. But, such simple situations may not be the whole story. For example, drugs such as phenobarbital may alter the hepatic enzyme balance with concomitant alteration of the metabolism.

It is evident that little is yet known about such interactions, with many other probable causes still obscure. These may include physiological factors associated with age and nutrition. It may turn out that much occupational disease would not occur except with interaction of two or more agents including those in the work place and those inherent in the individual.

One such situation was identified and discussed briefly this morning by Mr. Lewis and others on the question of cigarette smoking.

This has a bit of history. We had seen in New York that 20 percent of the asbestos insulation workers being followed by us died of cancer. We commenced this study on January 1, 1963 and by April 30, 1967 no death from lung cancer had occurred among the 87 men with no history of cigarette smoking, despite their many years of occupational exposure to asbestos.

In contrast, 24 deaths from lung cancer occurred among the 283 men with a history of cigarette smoking, although only 2.98 such deaths had been expected.

It was suggested at the time that the combination of the two factors—asbestos greatly increasing the lung cancer risk of cigarette smoking—had a sharp, multiplying effect. It was calculated that an asbestos worker who smoked cigarettes had eight times the risk compared to smokers of the same age who did not work with asbestos, and 92 times the risk of men who neither worked with asbestos nor smoked cigarettes.

We started a long-range study, and in 1967 we followed 2,066 asbestos insulation workers who didn't smoke cigarettes, also 9,500 who did. When we followed these people for the next 5 years who did smoke, we found, as we expected, of the 9,000 with a history of cigarette smoking—where there should have been 31 deaths, 179 occurred. That comes as no surprise.

But, of the 2,066 who didn't smoke cigarettes over the 5 year period, from the general rate set by the United States, that includes smokers, there should have been 7.5 percent deaths due to lung cancer. And let's say 7 out of the 7.5 were probably due to smoking in the general population. But, we only saw in the 2,066 nonsmokers over the 5 years only two deaths with lung cancer. So there certainly can't be much of a lung cancer effect without the cigarette smoking. Certainly, no great increase. With a combination of this, this is very markedly so. These data have since been amplified by studies among uranium miners and

even survivors of Hiroshima and Nagasaki. After the atomic bomb was dropped, smokers in the next 20 years had much more lung cancer than nonsmokers in the Nagasaki population.

We even have begun to see that the incidence of leukemia among radiation exposed survivors at Hiroshima and Nagasaki is augmented by occupational exposure to benzene in the years after radiation exposure.

I think this ought to be sufficient.

Dr. ROBERTS. One of the hardest things is to hand Dr. Selikoff a note saying your time is up. I never get tired of listening to him.

We will now go to Ernest Dixon for a response.

Mr. DIXON. As many of you know I ended up being a late substitute, thrown in in the place of Paul Kotin. My first opportunity to see any of the papers was last Saturday late, as a matter of fact, at the end of the work day yesterday, there was one remaining outstanding paper, that of our eminent friend Dr. Selikoff, whose paper I have to discuss. However, with the cooperation of airlines and mad dashes across the canyons of Manhattan, and a late flight, I did get a brief period to review it prior to bedtime.

His philosophies are not fundamentally different than mine or most of us, I am sure. In fact he aided me in planning a paper on somewhat related matters a year or so ago. I have no quarrel with anything really that he said. But, I have a few comments on parts of it. I will exclude comments on the smoking part due to personal agonies.

With respect to multiple exposures, I think we found now in our real world that this is really where the action is. At any given moment or certainly over a period of time virtually every worker that has a chemical exposure will have more than one. Many times multiple, multiple factor exposure. And I am not just talking about the chemical industry, but there are many other industries in which chemicals or products from chemicals are liberated into the work place and may be the source of potential exposure.

Perhaps it was otherwise in the past when industry was much more puristic and simpler, but certainly that is not the case today. Accordingly Dr. Selikoff's first stricture on the one cause-one effect relationship is indeed true.

As to multiple effects of individual exposure, there are many examples such as Dr. Selikoff stated with occupational exposure. Similarly this is true with natural diseases, or so-called natural diseases. With respect to acute versus chronic, local versus disseminating, various organisms involved. The occurrence in well versus unhealthy, young and old, male and female. There are many good examples, perhaps two that are particularly well known are the great imitators: tuberculosis and syphilis. But many others manifest themselves differently under different circumstances.

As to interaction of occupational and nonoccupational factors, the variability of human response is truly dramatic. In determining interaction of a potentially hazardous agent, one must consider all the variable characteristics of the individual, such as respiratory rate, size, metabolic pattern, genetic constitution, personal habits, multiple factor etiology, and other aspects of variable response. In other words, the real measure of hazard to the worker is what is absorbed into his system and the physiologic response which this engenders.

In situations of mixed exposure one must consider the possible metabolic interaction, individual peculiarities of work habits leading to abnormal intake, and additive exposure from off-job activities.

The complexity of health evaluation is a very real problem and grows with the passage of time. Simple tests and observations over the past year have been supplanted by vastly more complicated and technically involved methods.

The report of the National Commission on State Workmen's Compensation Laws stated:

Technological advances have produced unfamiliar and often indeterminable physical and toxic hazards. Occupational diseases associated with prolonged exposure to unsuspected agents or to fortuitous combinations of stress, have undermined the usefulness of the "accident" concept.

While advances in medical knowledge have facilitated the treatment of many injuries and diseases, they have also enlarged the list of diseases that may be work related. The simple cause-effect concept of the past has yielded to an appreciation of many interacting forces that may result in impairment or death. In addition to genetic, environmental, cultural and physiological influences, physicians must consider predisposing, precipitating, aggravating, and perpetuating factors in disease. Etiologic analysis estimates of the relationship to work and evaluation of extent of impairment have become accordingly complex for many illnesses.

Perhaps that statement most clearly enunciates the theme of this meeting. Thus, it is readily evident our medical task is difficult. The basic predicament in occupational medicine is a limited technological capacity for medical surveillance analytical methods. When one considers the large number of chemical substances in use in contrast to the few for which we have established and confirmed ability to assess cause and effect reliably, the magnitude of the problem is readily apparent.

This brings me to several additional matters of great concern to me. These are actual practices and standards for four things: medical surveillance, industrial hygiene monitoring, epidemiology, and the impact on workers' compensation.

The first, medical surveillance. At this point I would like to offer a strong plea to please let's use that term and let's forget biological monitoring of people. People don't want to be biologically monitored, they want to be taken care of as people by medical individuals.

I am troubled by all kinds of new surveillance schemes and differing requirements under new standards. I certainly agree to the importance of allowing for judgment and not circumscribing individual initiative, but the lack of any uniformity will create a night-marish set of problems and utter chaos in any effort to assess the worth and value of surveillance.

This is especially true when one considers the multiple exposures with different medical requirements. One can envision a man employed who in the course of a year has 10 different chemicals to which he has had exposure requiring surveillance, and having 10 examinations, and being almost bled and X-rayed to death. And the poor physician on the other hand not knowing what he is doing half the time seeing the fellow at his door constantly.

It does drive physicians up the wall and we are already finding in many instances they are being unwilling to cooperate because of this confusion.

I feel we need a uniform basic core medical, surveillance scheme: Consisting of appropriate history, physical examinations, probably

the chest X-ray, pulmonary function, urinalysis, hematology, and at least a sufficient number of blood chemistries to establish the fundamentals we need. That will be done in virtually every instance of exposure and will provide a uniform base.

To that in each instance of potential exposure for which there is a unique or specific test or tests appropriate, it would be added. For example: in lead, we do blood for urine tests; inorganic phosphates, you add colon X-rays; and with vinyl chloride we did the thing we would add in that circumstance. But the fundamental basic examination would be uniform. Thus we would have a single procedure for all with only adding specifications.

And the result as I see it are fourfold: simplification of all surveillance for all concerned with an avoidance of duplicity and redundancy. Second, much easier to administer by all medical and health personnel. Facilitate comparison studies much more easily from facility to facility, industry to industry, et cetera. And facilitate both long- and short-term retrospective or other epidemiologic studies. And finally, would provide a base for appropriate long-term audit of results.

Second, in the area of hygiene monitoring, we have customarily, in the past, lacked sufficient history of potential exposure and a lack of precise analytical monitoring. We now have much improved techniques that make this easier, but if we look back at the problems of the past, we can only guess as to what the exposure levels were and we can very rarely find out all the things to which an individual was exposed.

In the same concept as Irv mentioned at one point in his talk, we have to be concerned with a lot of other unknowns, the least of which are coincidental exposures unknown to the individual, contaminants in material, trace materials, and a variation of content of so-called standardized materials, which very often are not standard.

In epidemiology or in the epidemiology of both occupational health and an illness, and for that matter natural disease, the state of the art, not the state of the art but where we are in it, is truly atrocious. Without a usable valid base of medical surveillance and related work exposure data, as I have just discussed, the best of epidemiologic schemes will be of only crude quality.

In this connection there is a deep need for auditing both short- and long-term, the results of our surveillance and epidemiologic efforts, to assure that it is succeeding in helping to protect the health of the worker, or, if not, to elucidate corrections and changes that must be made.

With respect to worker's compensation, qualification of disability and assessing the degree attributable to occupation really defies or alludes us technologically today. This precludes the other perspectives of concern—such as insurance, legal, moral, economic—from being dealt with objectively on a wholly fair and rational basis.

Certainly proper recognition of occupational disease on the input side of the equation, as was mentioned this morning, is the weakest link in the entire problem. I see no magic answers in the immediate offing. There is a great need for a long-term follow-up on the natural history of disability in relation to the compensation practice.

The true impact in both economic and human terms should be the ultimate measure of a proper system.

To sum up I would say it is currently impossible to establish a rational basis for assessment of the impact of all the combinations of exposure in many different agents and proportions.

The sum effect is a consequence of interaction of the impact of social and natural disease, the influence of occupational exposure, the impact of all other environmental and personal endeavor factors, and I believe our greatest efforts should be less directed to the numbers game and more to establishment of principles and systems that may help us all.

Dr. ROBERTS. Thank you. Now could we invite some comments from the panel.

Dr. Mancuso.

Dr. MANCUSO. I am concerned the data Dr. Selikoff has presented in particular in response to asbestos and cigarette smoking be put in the proper perspective because of the confusing effects in the interpretation of smoking in relation to worker's compensation.

The major evidence of this relationship was the report by Selikoff and Hammond. The data that has been presented at this meeting relates to one specific aspect. The original observation, and his own, was 92 times the risk of men who neither worked with asbestos or smoked cigarettes.

This is not a comparison of smokers versus nonsmokers at the same plant in that study. I should like to point out that there may be differences in rates when there is a further adjustment of statistical analysis of Dr. Selikoff's data.

The difference in the analysis, in determining the rates, occurs in the use of how the expected rates are derived—in particular, as shown in table 4 of his present report now, but my analysis relates to his published data that appeared in "Biologic Effects of Asbestos."

In table 4 of the present report, it is stated: "Expected deaths are based upon age-specific white male death rate data of the United States National Office of Vital Statistics from 1963 to 1971, disregarding smoking habits"—and I am underlining "disregarding smoking habits." That is the point I am referring to. In contrast, if however, the expected is adjusted as derived from Harold Dorn's smoking cancer study, pertaining to the rate for smokers and the rate for nonsmokers, a much closer examination occurs between smokers and nonsmokers among asbestos workers. Since Dr. Selikoff's study shows that the majority of workers were smokers, the expected rate then that would be derived from smokers would be a different rate. Similarly, this would also apply for the nonsmokers.

The actual calculations that were done, based on published data shown in Dr. Selikoff's and Dr. Hammond's original report, the observed and expected figures—and I will read them, giving the adjusted figure: On the original data as represented by Dr. Selikoff and the adjusted data by Vivian Henderson, among the smokers observed was 134, expected was 25.09, with a relative risk of 5. Among the nonsmokers in that original group he observed two cases and expected 5.98, and the relative risk was 0.3. You have to compare the 5 to 0.3 there.

If you take the same data, and this was not done by me, you have the observed and expected among smokers. The observed among smokers becomes 134, the expected becomes 30.06, with a relative risk of 4.4. For the nonsmokers the observed was 2, the expected was 1.01 and the relative risk was 2.

Then the relative risk is reduced, that is, 4.4 for smokers and the relative risk for nonsmokers being 2. I would like to say further that, however, when this type of adjustment is made, there are additional limitations relative not only to this study, and this does not relate just to Dr. Selikoff's study but to all studies which deal with the smoking problem.

I should like to cite some of the limits I see within this data: Although the study population is divided into smokers and nonsmokers, the population used to compare the study data, that is, the control group was composed of both smokers and nonsmokers. In this process there is an underestimation of expected lung cancer for the smokers and an over-estimation of the expected of the nonsmokers.

There is no data available on the years of onset and duration of the smoking for each category of smoker, and there is not data available on the amount known relative to the date of onset and duration of smoking and date of onset of the asbestos exposure and duration of asbestos exposure. In many of the studies there is a significantly high percentage of the study population in which there was no smoking history available. In the Selikoff study that I refer to the absence of cigarette smoking data is extensive—34 percent have no smoking history.

Now, the other point I would like to make relative to the comments on genetics or psychosocial factors is that the observation of a relatively higher death rate due to lung cancer among asbestos workers has already been observed in different States and different regions in the United States and other countries.

Further, in the study of a particular plant in the United States, the population of that plant is derived from that community and the surrounding area with its socioeconomic characteristics. In any particular department or process, or for the entire plant, the same characteristics apply relative to the policies of the company; all had the same level of medical examination; all met the same characteristics of being hired, fired, or retired. With all these factors constant in an industry, occupational cancer can be readily identified.

What I am concerned about in the cigarette smoking business is it can be very easily misused. I think Dr. Selikoff will definitely agree industrial exposure is a causative agent, but nevertheless I have seen it here and it will happen again, how this will be misused relative to an interpretation of smoking as it applies to worker's compensation.

What has not happened, and I am very much put out about it, is the lack of application of the same scientific criteria as would be required in the scientific investigation of, for example, virus X, the criteria of which has not been applied to smoking studies—and I am not referring to Dr. Selikoff's study—but studies where individuals will write in the literature and will automatically characterize somebody as a smoker or nonsmoker without specifying the criteria from which they are deriving that data. One ought to be very careful about that.

Dr. ROBERTS. Dr. Halpern?

Dr. HALPERN. I would like to return to stress. There has been a lot of misleading information coming out about the effects of stress on resistance. A lot of it has appeared in *Psychology Today*, which typically publishes findings very, very early. And sensational type findings, and also publishes garbage.

There has been subsequent research done especially at the Disease Center in Atlanta, and a great deal of research on stress and resistance, and the effects seem to be somewhat less than appears to be the case from publications in *Psychology Today* and other publications, and there is no information I know about, about the effects of stress on lowered resistance.

I would be very, very reluctant to accept out-of-hand, to accept it as fact that increases in stress, lower resistance. I don't think there is enough evidence out to suggest that is the case. Also, it is very, very difficult to define stress, and also the amounts of stress.

That is my response.

Dr. ROBERTS. Tony?

Mr. MAZZOCCHI. The fact is occupational disease which is admitted to be an ever-increasing problem—and the fact it reached the point of recognition is why we are here—occupational disease is not compensated because it is not identified. It is not identified because the worker doesn't understand he is affected by something he worked with. And we can't go to workers' compensation because they never arrive at that point.

We stress cause problems, smoking does or does not—it is axiomatic in that the worker's need who is diseased is not being met.

I would like to deal with something Dr. Discher said because I think it essentially is a first step. Conferences can't resolve all the problems we are dealing with. They can only act to introduce a catalyst that will create another conference that will take us a step forward. That is what I see coming out of a conference of this sort.

The worker doesn't recognize he has been diseased or affected because again there isn't medical surveillance. There isn't monitoring inside the work place. There isn't identification of substances. So we get nowhere, regardless of what you decide is a scientific fact or non-scientific fact unless you get it to the worker.

Transmitting of facts has to be an essential part of any workers' compensation scheme. And another point, I think smoking becomes a smokescreen. I don't know who is right or wrong but I don't think we can wait for the results on what smoking does or does not do.

Dr. ROBERTS. Mr. Schubert?

Mr. SCHUBERT. I have to agree with Tony. A worker who has a disease has a need that has to be addressed in some fashion, somewhere in society. It seems to me in an orderly structure of governing ourselves, it may be useful to try and identify where that need emanated from in order to assess some kind of liability.

I realize it can be where occupational disease finally should be covered by a very comprehensive, very, very broad approach, and thereby skip over all the multiple-type cases we have been discussing.

I think my concern realistically from a background in government, if one begins to move down that path, one that tends to assume so much, you either come up with an approach so broad and detailed you can't

possibly meet the crying concerns in society or nothing ever happens.

You develop so much specificity you can never get anything constructive done.

I am just concerned by the broadening scope and definition so much as I talked in the session this morning, and again as we are moving this afternoon.

We develop for ourselves an immovable object that we can't get around and move realistically.

Second, I have been under the impression from a practical standpoint for the proper societal response to disease and cause it has to be related to the possible societal response to cause; in other words, standards and measures to protect the worker.

Preventive standards, and I kind of despair when Dr. Selikoff said and the response of Dr. Dixon, where there isn't any way to develop standards by causative agents by NIOSH and OSHA in the situations where there is so much possible interaction, so many multiple factors.

I kind of despair having watched as a participant the development of PVC standards, as well as 13 carcinogens early in OSHA's career. Sitting in a room with 13 scientists 1 night, there were 15 opinions on what to do in establishing standards. And then we introduce this equation of the multiple factors, that stress factor, as well as genetic qualities of the individual, and how we can ever go about in society establishing standards and standards that reliability the industry can live with.

I guess my overall concern is we have broadened the perspective here where we don't have the ability to do anything with our most compelling needs.

Dr. ROBERTS. Phil?

Dr. ENTERLINE. If you can't handle causes one at a time, how can you handle two, three, four at a time?

In the case of smoking, it doesn't appear based on the raw data that if you stop smoking, if a person stops smoking they won't get lung cancer.

If we reanalyze, we have to agree with the analysts' data. They collected it. We have to agree with what the analysis was. But, in the reanalysis, it shows nonsmoking asbestos workers are at risk and stopping smoking is not a solution to stop the incidence of cancer in an asbestos worker.

I think it is interesting once we get——

Dr. SELIKOFF. What are your reasons for that assumption?

Dr. ENTERLINE. I wrote down, he has a double risk.

Dr. SELIKOFF. You are something of a statistician, don't deny that. If you are going to say an exposure of 1.2 as opposed to 2, allows you to form a ratio, you are in left field. You would not give a ratio when you have 1.2 exposure and 2 exposed, would you? Double the risk?

Dr. ENTERLINE. You gave a ratio of 1.3.

Dr. SELIKOFF. I am sorry, that was not based on that.

Dr. ENTERLINE. He gave a ratio of 2——

Dr. SELIKOFF. No; it was not based on 1.2. It was 5.9.

In taking smoking into consideration, which I will explain, but it isn't right to say nonsmoking asbestos workers have any considerable

increased risk of lung cancer when for almost 11 years our observations of nonsmoking asbestos workers showed only two deaths. That is no very significant increase in the risk of lung cancer.

There should be no misuse of facts. I share his apprehension—

Dr. ENTERLINE. I can see why people are confused. One analysis suggests if you stop smoking—

Dr. SELIKOFF. Not if you stop smoking.

Dr. ENTERLINE. If you never smoked.

Dr. SELIKOFF. We don't know anything about stopping.

Dr. ENTERLINE. The same data analyzes in a different way. You have a double risk even if you never smoked.

Dr. SELIKOFF. I will repeat, you can't say double risk based on two cases in 10 years of observation. As you say, let's get more data. When you give a statement based on 1 versus 2 in a population of 2,000, you can't do that. You wait until you get more data.

Dr. DISCHER. I would like to suggest this is throwing up a cloud of smoke and it is not—

Dr. ROBERTS. Before we get through though, I would like to hear Dr. Enterline's reaction to Irv's statement you can't draw the conclusion you have about two cases over one suspected. How do you respond?

Dr. ENTERLINE. You act upon whatever data you have. Even when one appears to be better than the other, we have to act on what we have. We have to act. That is the situation. On that I would accept Irv's data for what it is worth.

Dr. ROBERTS. I didn't think I would hear a biostatistician draw that conclusion of 2 over 1 in a population of 2,000. Would you publish that?

Dr. ENTERLINE. The question is if you must act. Let's suppose you must make a decision.

Take your grandmother. It is obvious your grandmother is dying of cancer. There are two techniques: one has a 45-percent chance of success and the other has a 42-percent chance of success. The difference isn't statistically significant. Which treatment would you give? The 45 or 42? I think that may be the situation we find ourselves in.

UNIDENTIFIED VOICE. I give up, which treatment do you give your grandmother?

Dr. ENTERLINE. That depends if you want to keep her or not.

Dr. ROBERTS. If there is no statistical difference—

Dr. ENTERLINE. Would you flip a coin? I would not, I would take the 45 percent.

Dr. ROBERTS. You stand a 50-percent chance of being right.

Chairman BUNN. Let me interrupt and bring to your attention that there are certain key issues in the course of the afternoon that we want to consider.

Let me reemphasize these for you.

(1) What information is needed and how can it be obtained to more accurately determine if a disease was partly or totally caused by the work environment?

(2) Should impartial expert evaluations, medical and other, be utilized to assess the compensability of a disease?

Another section we are dealing with on the next issue in this general panel session, and I think we have not touched on it yet, is what are

the strengths and weaknesses of presumptions and guidelines? What information is needed for establishment of presumptions and guidelines? For what specific diseases and group of diseases are presumptions and guidelines most feasible? What is an acceptable level of error in the use of presumptions?

Now, Dr. Mancuso will speak to some of these, and I assume the area of presumptions will be dealt with in some way as they are used in the current compensation act by Mr. Lewis, and again by Ms. Snyder and Mr. Solomons in discussing the black lung program.

Since this is one of the issues assigned to this particular session, I would be interested in hearing about the strengths and weaknesses of presumptions and especially with presumptions if you have some experience.

Dr. ROBERTS. Anyone else?

Dr. CORN. Retrofit is our problem. The cost of a new facility to deal with the most extreme cases of exposure is 15 percent of the capital cost. I think we have to get educated that that is a cost of doing business and we will avoid assignment of multiple agents—which did what and who pays for it.

But the retrofit problem is a very real problem and the dollar costs are great. But I would hope by starting to instruct in our engineer and architectural schools and building this into the way of doing business that that 15-percent front-end cost will avoid what we are talking about here.

Dr. BURTON. That is an enormous amount of money. Before we spend 15 percent of capital cost, I want to know what I will get out of that. You don't talk about that, only the cost. But what else can I do with that money. That is one of the real problems we have in this field. There is an attitude that safety is worth having at any price.

Dr. CORN. If I can defer, I can suggest you read the forthcoming inflationary income statement.—

Chairman BUNN. Let me interrupt. Dr. Corn is ready to leave and I want to thank him personally—and Dr. Finklea—both gentlemen have to be in Washington for a hearing tomorrow, but we are appreciative to them for participating with us today. Thank you very much.

Dr. BURTON. As a matter of information, I wonder if we could go back to Selikoff—I am not sure I understand the implications of what you are saying for having workers' compensation as a viable program.

Dr. SELIKOFF. I suspect those workers' compensation statutes which are related to specific agents are, despite Mr. Schubert's discomfort, just not real. I share his discomfort. I would like a much simpler world. I think all of us would. The world is the way it is.

The facts are we have a combination involvement. How the workers' compensation people will approach this, is now up for grabs. I suspect there will be a turn from agents to work situations, and the burden of proof will no longer in my opinion have to be that a measurement, was or wasn't made, and give a level of this or that, but rather that the disease was associated with the work process.

Very few measurements are made. In fact, if we deal with diseases with long periods of clinical latency, the measurements we need were not made 20 or 30 years in the past. They couldn't have been made

because apparently we didn't suspect the agent at that time. If we suspected the agent since, it is unlikely we can go back now very often and duplicate a situation with regard to measurement at this time because if there is suspicion, those agents very likely will be replaced with another one. So that we just simply will not have the kind of information workers' compensation hearings have wanted in the past.

The second implication of this is that with regard to monitoring, I have very little confidence that this is going to be done readily despite Ernie's proposal that it be done. Monitoring is again very expensive. In a combination involvement, what are we going to monitor? Obviously, if we don't suspect most of the things, we can't even look to automation of monitoring. Then we will have a huge set of discs for our computers, huge reels of tape for our computers. We won't know how to manage the data. I think industry now has the problem it doesn't know what to do with the few monitoring data that are being obtained.

With regard to the extent of disability, what is the relevance of what percent with regard to disability? Well, there is no consistent relationship. Even excessive exposure is by no means synonymous with this ability. Nor can individual workers' difficulties be protected from what we call intensity of exposure, and each case is going to have to be decided on its own merits. This is difficult for worker's compensation, of course, but it is, this is really the situation. I would rather life be certain, but unfortunately it is not.

Now may I take advantage of this moment to speak to medical surveillance. Medical surveillance is going to be, I think, a darn good thing. We have examination underway in industry. It has been part of the last 40 years of history and it would not be difficult to add onto it, surveillance for occupational disease.

That doesn't mean what is going on now is medical surveillance. The smelters I just studied in Indianapolis were doing biological monitoring. People were examined. He stuck his arm out, blood was taken, and a sample done. That is not medical surveillance, it is clinical collectory.

That doesn't take away the potential for medical surveillance. This is a difficult proposition that unions and the company will have to work with.

Right now someone from my lab is in New Jersey doing a study of one of the Allied Chemical factories that Tony Mazzocchi referred to. This is medical surveillance. And look at what happened for the first time in our experience, a company like Allied Chemical gave us a complete list of everything the chemical workers in that plant are exposed to. Not only that, but giving it to us according to length of exposure of that man 2 days ago, 4 days ago, to help us in medical surveillance.

This is a new world. It is a tiny world, but as Tony suspects, it is liable to extend greatly.

I don't share his pessimism with regard to the epidemiologic usefulness of such surveillance. I would like it to be much better, but let's use what we have now. Use the best estimates possible. Use company records—they are hardly utilized. Use union records. I am much more optimistic about this.

Dr. ROBERTS. Mr. McMahan?

Mr. McMAHAN. I think before we can talk about presumptions as a mechanism for shifting the burden of proof or assigning liability in the compensation system, we have to go back to our definition of occupational disease, and here as I have been listening today I have heard speakers fluctuate conceptually in describing an occupational disease, and I think the reason is we have been using it in two very different senses today.

There is only one sense in which it is relevant to much of what we heard about determining causation and exposure and that is, is a disease work related? Is it caused by an exposure through work?

Now, for scientists I assume presumptions have no place in that determination. They want to know for purposes of patient treatment and rehabilitation, and all the inquiry we have heard concerning multiple factors, this is really only relevant to that.

The second sense in which a definition of occupational disease is discussed is purely for the assignment of the burden, the economic burden that arises from disease. Assignment from some sector of society the responsibility for paying, instead of the diseased worker paying.

I think implicit in all our thoughts, but not as general a declaration as we might think, is there in some connection, if a matter of a violation of law, there should be some connection between causation and assignment of financial responsibility.

Much of what I heard today suggests the problem we are dealing with in that connection is not necessarily viable. It may not be determinable. We can say a disease is occupational because we can prove it is work related even if it results from multiple causes and factors. We can equate whether a disease is occupational because the incidence is greater among those workers, without any attention to the cause of it.

But then, we can't treat it.

We could also say a disease is occupational because we call it occupational. Anyone who works in a certain industry will be treated as if he is ill. That is an economic judgment and has nothing to do with connecting to the cause of occupational disease. That is a definition of import when we deal with presumptions, because a presumption is in the proper sense in law merely a device to shift the burden of proving something from one party to another. Traditionally, in workers' compensation law and in all law presumptions have existed to redress an unfair balance of either access to information or resources to shift origin and is work related, you are, in effect, defining disease as occupational disease, who satisfies certain criteria, will be presumed to have until the one being charged with that responsibility can disprove it. That in one use.

Presumptions can be used in a definitional sense in which case that merely describes something and cannot be disproved.

In case of diseases whose causes are multiple factors or single causes, or not known, if you elect a presumption that disease is occupational in origin and is work related, you are, in effect, defining disease as occupational disease but no one cause for it, and no one can prove it. There are presumptions. It is legislation. It is a policy judgment none of us should lose sight of in these discussions.

Dr. ROBERTS. Mr. Guy?

Mr. GUY. My first comment—there are two or three cases around the country that held violation of safety standards is evidence of negligence per se, and held the employer liable.

There are also two cases that go the other way. So, the question of violation of safety standards is very much up in the air and lawyers are very much aware of it. We will see a lot more litigation in that area.

Tony made a point earlier I didn't agree with. When he said O.D. is not being compensated. I will agree O.D. is not being fully compensated.

In 50 States the Longshoremen's Act provided for occupational disease provisions. Claims are being made. There is not a coal operator in this country who will say he is not paying pneumoconiosis cases.

Mr. SAMUELS. Could I ask a legal question of Mr. Guy? If a question goes into a OSHA hearing and there is such presumption and then some years later a worker develops a disease related to the environment which was to be controlled, what is the company's legal responsibility?

Mr. GUY. I don't think the company has any other than the existing workers' compensation status. Are you talking about willful violation? There are some statutes that hold that, but I don't think that is in the same context of what you are talking about.

Mr. SAMUELS. I don't mean eligible for workers' compensation. Let's say it's a third party suit. What is the legal responsibility for a corporation who is very prevalent in setting standards, but it ultimately results in disease?

Mr. GUY. You have to bear in mind most of the workers' compensation statutes prohibit several suits between employer and employee in that context. There is no liability unless the employee can establish there is willful intent.

Dr. ROBERTS. If you want to make a comment, please state your name.

Mr. MITTELMAN. Gene Mittelman. If I understand Shelly's question, it is the employer embraces some occupational standard and 10 years later it is determined the employer was wrong. The substance in question was really toxic. As I understand the compensation statutes if indeed the employee can show he got a disease from a substance from the work place he will collect worker's compensation.

Mr. GUY. I thought he was talking about third party liability. With any third party liability workers' compensation doesn't apply. We are talking about negligence per se.

Mr. MITTELMAN. These are questions whether standards are responsible care of hazards and it is absolute. You can guess.

Mr. GUY. He was talking in the context of an employee serving an employer.

Dr. ROBERTS. Could I interrupt, please? Tomorrow we will be talking with Dr. Osteritter about his paper dealing with presumptions and guidelines. For that reason I was trying to keep our course this afternoon more focused on the question of what information is needed and how can it be obtained to determine more accurately if disease was partly or solely caused by the work environment.

We have a few minutes before the break, about 8 minutes before we have coffee, and then we will be inviting questions from the audience. Let's use the last 8 minutes to focus on our prime subject. Marvin?

Dr. AMDUR. There was a comment made about the significance of medical surveillance. We really aren't talking of acute disease but of chronic disease. And you have to remember people have sequential employment.

How are you going to survey for something in 1976 that may have been pertinent in 1974?

In the same vein I want to cite a practical example of what occurred just before I started for Chicago. We have a group that makes undercoating and asbestos as an additive. It is a small group, about eight men each year. I have been doing these for 4 years. Last Saturday only six arrived, and I called the employer and asked where were the other two men. He said he only had six men in the company; one man was working elsewhere and the other guy changed his employment. I had to point out that once you start, the surveillance must be continued.

My question is, wherein lies the employer's obligation for an employee that changed his job and is working for another employer and has another exposure, and from then on he doesn't know what the exposure may be. Does the doctor or employer have an obligation to chase him and say you have something that has to be watched for 40 years?

UNIDENTIFIED VOICE. If the employer goes out of business, we will do it for him.

Dr. FINKLEA. These problems of the changing workplace—we have many, many women of child-bearing age coming into jobs where they will be exposed to agents at or above Federal standards. There may very well be adverse effects on their offspring. These effects are not part of the compensation system. These are effects with regard to the drug industry, that have resulted in large awards in the form of third party suits that we talked about earlier. This is an area we clearly need more information on because of our concern.

Chairman BUNN. I would like to respond briefly to whether or not the comp system should be expanded to include any type of birth defects. I tend to think that the compensation system is a system to compensate employees. The child is not an employee. That does not mean there shouldn't be some way of compensating a child *en ventre sa mere* that does receive damage as a result of his mother working in the work place. Allowing the child to recover would not be a traditional workers' compensation claim. Possibly a recovery could be made in the way of a common law tort claim. In any event, it would be difficult to expect workers' compensation to pick up the child's claim.

Ms. SNYDER. To answer the question on worker mobility and liability, the U.S. Department of Labor in writing guidelines for the black lung program decided on the last operator, which my neighbor Mr. McMahon is trying before the Supreme Court at this time. We could have gone to prorating liability for workers who worked at various coal mines, but that would have been impossible. We could have gone with the longest period of service. But, we did go with the last operator for many reasons, including record keeping and the administrative burden of trying to trace the history of a steel company or coal company and the employee's duration of work in one place or another.

This fact is being questioned constitutionally right now and we should have a decision from the Supreme Court in a few weeks.

Dr. DIXON. Mobility of the worker—this very much enters into the conference on the matter of multiple factors. Multiple interaction at a given intensity and multiple interaction of one exposure in 1940, something else in 1950, and something else in this current year. We really need to somehow devise a system that will provide for a continuing record that goes like the military medical records of a person. Although you have confidentiality, everyone keeps a running record of the illnesses he had, et cetera.

That is one of the reasons the epidemiological problem is so different. We don't have them even with a man at the same plant for 20 years. It is difficult. It will require sophistication in order to be useful.

In every study on medical surveillance I had to do with in a hospital or clinical practice of an occupational nature, we looked through the medical records and it is a big mish-mash and all sorts of confusion. There is terrible inconsistency and we tried to put something together and it is like comparing apples and kumquats. That is why I made the plea for working for uniformity.

Dr. ROBERTS. I am sorry to interrupt. It is 3:30 and time for the coffee break and we are supposed to be back in 10 minutes. We have another paper to discuss, so bring your coffee down and drink it at the table.

(Whereupon the coffee break was taken.)

Dr. ROBERTS. Does anybody in the audience have anything?

GENE MITTELMAN. Legal consultant for the Senate Labor Committee. One of the problems that the Senate and House Labor Committees are attempting to deal with in Federal legislation providing national minimum standards for workers' compensation is the problem of occupational disease.

The approach of the Senate is to give the Secretary of HEW, subject to the consent of an advisory council, the power to promulgate a standard for determining the existence and causality of occupational disease. The House bill does not go quite as far. It doesn't have standards binding on State agencies, but it gives the Secretary power to recommend such standards.

The problem I would like to lay before you is that with all this ambiguity and complexity in this field, a decision has to be made here and now as to which worker should be compensated through the workers' compensation system for diseases and somebody has to cut the knot.

The black lung program has been heavily criticized for not being consistent with medical standards and being a welfare program. I am not here to defend or criticize that.

The point I would like to make here is for comments from this group on the performance of the States so far as determining the compensability of occupational disease. I am not just talking about whether the law covers a disease or doesn't cover a disease. That is a coding problem in legislation that can fairly easily be dealt with.

The problem is determining whether a particular man has a particular disease and if so, is that disease compensable? Black lung legislation came about because it was presented to Congress and the States recognized black lung as a compensable disease.

In my own visits to State workers' compensation agencies, what I see happening, what I hear being discussed is most occupational disease cases are decided on the basis of what a particular doctor has to say in that case.

I personally feel that there is a very, very definite requirement—and I think that is complicated by what was said this morning—for a set of standards, call them Federal if you will, but a set of standards which will be operative throughout the country, including where appropriate, presumptions, so that this problem will be treated with a degree of uniformity throughout the country.

Chairman BUNN. Let me interrupt if I may before it gets into general discussion. In response to your question dealing with what the States have done, I would like to hold this discussion until we get into the legal and administrative way in which States handle cases, which will be coming up tomorrow and the next day.

Second, tomorrow we have a special presentation which George Sape is going to present to the committee on the proposed Federal legislation. So, if you will indulge us, I would like to hold this area until tomorrow.

Dr. ROBERTS. We will have two more questions.

Mr. CHISWICK. I am mindful of the fact reducing occupational disease is not very good and costly, and yet occupational diseases are costly in themselves. The question arises then as to what kinds of strategy can be adopted to reduce the incidence of disease resulting from toxic substances.

One question I had was — suppose I were exposed to some toxic substance for 10 years. Am I half as likely to contract some disease as compared to a situation in which I have worked for 20 years? If the answer to that question is yes, that I am less than half as likely, this raises the question of what labor policy may be most effective in reducing the incidence of illness for the same level of toxic substances in factories.

Dr. ROBERTS. That question is going to be dealt with to some extent on Thursday when we turn our attention to programs to protect the worker from occupational disease.

Mr. SHEEHAN. Jack Sheehan. I want to say I am not rising to support my colleague in the steel industry, Dick Schubert, but I do share some of the apprehension he has with regard to the discussion of the multiple factor interaction. My apprehension about it is the degree to which the scientific community begins to see there are multiple factors at work in the work place, the impact on workers' compensation I think can be very serious.

Listening to my friend from Senator Javits' staff in terms of the Senate bill, and I am beginning to wonder whether the provisions of that bill, as it relates to compensation for occupational disease, are very adequate or inadequate on the basis that if we are going to look for causation or say a substance has caused a disease, and only on that basis will you award compensation, it may well be we have to move with even greater force into this concept of presumption.

One other comment I would like to make is, where we do have at least a promulgated OSHA standard, which standard has been violated, and the worker succumbs to a disease, I wonder whether that

standard, at least to begin with, any disease that has resulted from willful violation, that perhaps we should allow tort liability in that area.

And one comment the chairman made with regard to the fact the child of a woman may be exposed might open the door to another system, I am wondering whether willful violation of the standards might open that up.

Dr. ROBERTS. We will now turn to Dr. Mancuso who will talk about the medical aspects of this subject we are covering this afternoon. How he will cover in 20 minutes what he wrote in 110 pages, I don't know.

Dr. MANCUSO. Thank you very much.

I don't know myself. I am going to try. It will not be as orderly as if you were reading the document, it would take you about 2½ hours to read it.

The point of the matter is I recognize this was a very important conference and was determined that I would provide whatever input was within my purview as a result of it.

Briefly, the document, the outline of the document has a background and a medical aspect of determining causality section, and illustrated some of the medical problems. The ones I used related to beryllium and chromates. Then I discussed at great length multiple exposures. And then I discussed industrial cancers. And then the matter of records and occupational disease. Then I discussed the OSHA standards and compensation, made a series of broad overall recommendations, general comment and a summary.

What I am going to do now within the 20 minutes time, with the help of the chairman, I am going to selectively read certain paragraphs and certain pages which give the principal point I was trying to get across, and I think that is the only possible way I can do it.

In the background section I have: The medical-legal problems associated with the administration of the State compensation laws represent sequential events derived mainly from the basic inequalities between the employee and the employers in terms of technical resources of knowledge, information and experience, that constitute the basis for informed judgment and direction in compensation cases.

Historically there has always been this tremendous gap between the professional and technical resources available to the employers and not available to the man on the job. Justice in compensation requires equality for both parties.

This lack of recognition of occupational toxic effects also extends to the impact of the several hundred thousand chemical trade name products used in industry, whose chemical composition is not made known to the worker, nor to his doctor, nor to the Government.

There is no legal requirement that such information relative to the chemical composition and the toxic qualities of the chemicals in the tradename products be filed with NIOSH for assistance in evaluating health problems.

Further, there has never been any legal requirement for the pretesting of industrial chemicals prior to their use in industry, relative to the toxicological and carcinogenic effects on the workers.

I would like now to refer to my statement in the summary which really poses the problem: How can a worker file a claim for an

occupational illness or disability, or his widow and family file for a death benefit when the worker doesn't know, when the family doesn't really know the chemicals, the hazardous substances to which he has been previously exposed during his employment; when he has not been told and can't find out the chemicals that are in the trade products that he is exposed to at work; when he has not been warned about the harmful effects, the toxicological and cancer effects of these chemicals at work?

How can a worker file a claim for an occupational illness when his own doctor doesn't know the chemicals and hazards in the workplace—what the working conditions are; when his own doctor doesn't know the trade name products used, nor the multiple chemicals within each trade product, nor know the toxic effects of each of these chemicals?

How can the worker know about the harmful effects on the job if there is no plant doctor, or if the doctor doesn't know the toxic exposures, or if there is no system of medical recognition of occupational illnesses, no system of environmental monitoring, no system of toxicological information, where records are not adequate, where all essential information even if in existence, is not available to the worker?

How can a worker recognize an occupational illness or toxic effects of chemicals when the industry has not been required to conduct adequate experimental testing of the thousands of chemicals prior to their use in industry; when there have not been the necessary studies, not only of the individual chemicals, but even more important on the combinations of the thousands of industrial chemicals used in industry.

How can a worker file a compensation claim, when the compensation laws do not properly recognize the scope of occupational illness and disease; when State compensation laws have not kept pace with industrial complexity, nor with the known scientific developments on delayed health effects of chemicals?

How can a worker file a compensation claim, when the worker is intimidated by the fear of losing his job; when even the fellow employees fear that the acknowledgement of the health problem or support of a compensation claim may cause them to lose their jobs. In essence, when the fear of punitive action by the company operates to discourage the filing of claims.

Now I should like to go to certain concepts relative to factors that must be controlled relative to recognition of occupational disease.

The attitude of the company to health problems, the acknowledgement or denial of health effects, and the economic costs of control, influence the presence or absence of industrial medical programs, the quality and level of performance, and the nature and extent of medical and environmental surveillance, if any, which are basic to the recognition of work-related disease and illness.

What I have done is list a whole series of critical points in which I have them illustrated by using beryllium and chromates and other things, as to how they impinge on each other.

Second, the nature and extent and accuracy of information on health effects of the range of chemicals used, and the degree of availability of this information to the plant medical personnel, the workers, the community physicians, as well as the availability of information concerning the plant work process to the community physicians of the

types and degree of exposures to specific chemicals, or other injurious factors; all influence the recognition or lack of recognition of work-related disease or illness.

What I am doing here, there are two ways to approach this particular problem. One is to focus on the specific law itself, as I hope to do tomorrow. And then see how you can improve the law. One is to meet what I considered a more fundamental problem. It doesn't make a difference theoretically how well you tune the law if a hundred occupational diseases first are not recognized or there is no system in existence to bring forth recognition.

What good does it do to say we provide compensation for a small finite group if a whole mass is not compensated? My whole theme is that we lack the basic system for the medical recognition of occupational disease both by the individual and by the doctor in the community. And that we do not have the mechanism within industry and the whole interplay to bring this about.

This is the main thrust of my particular concern. Unless you appreciate that, you don't realize the gaps exist nor do you realize the effort that needs to be put into it to breach the particular gap.

Now, I would like to refer to my recommendations if I may because I want to make sure I have time to cover that and then in the limited time I will cover certain other points.

I went on to discuss problems of multiple exposures in the work place that individuals are exposed to more than one substance in the work environment. It is very difficult and wrong to assume there is a particular pattern or syndrome or of a particular syndrome to a certain characteristic. We have to work on a series of presumptions and relative risks.

Now, my recommendations pertaining to filling some gaps. One is what I call the social security approach and you may not realize it, but social security has much of what Dr. Roberts or Dixon was referring to.

It has a permanent record of all employee records submitted by every plant covered by social security since 1937. These quarterly reports submitted by each company contain every name of each employee and the social security number of each employee for the period that the report covers. This applied to all industries nationwide and relates to every quarter of each year.

Social security can determine precisely the dates of employment and duration of employment of each individual. It can identify all the employees characterized by birth date and sex and social security number, and that is the employee population at risk for any individual year or successive years. Social security has classified by industrial and nonmanufacturing categories the particular type of industry and the products made for the industries covered.

Social security can reconstruct for each covered employee by social security number all prior employment and sequential employment regardless of the number of different employers, and also provide the duration of employment for each former employer. Social security can identify all those who have died who were formerly employed in a particular plant since 1937. Social security in addition to death benefits has initiated disability coverage within certain limits since 1955 and that is identified in length by social security number.

The point of all this is that there does exist a national resource which is uniform and provides a chronological work record on every employee with a social security number; that all the employees of a particular company at any point in time since 1937 can be identified within the Social Security Administration as a cohort for epidemiological study; that all the deaths that have occurred for this group can be determined by social security strictly by use of its own facilities.

In essence, the basic requirements for the conduct of epidemiological studies of any plant covered by social security since 1937 can be carried out by social security internally by its own research staff. The main point is that the Social Security Administration national resource overcomes the destruction of the personnel records of all the industries during the past 36 years and makes possible, as has been demonstrated repeatedly, that epidemiological studies can be carried out on workers employed, for example in 1937, 1939, 1940 through 1942, 1948 and so forth, and followed through 1975, and for any later year to ascertain causes of death. So that, in effect, if one wanted to determine what were the multiple employers and what was the duration of time an individual was employed in a specific plant, that can be done. That has been done. I have been doing it for a number of years now. I know what can be done.

The point of the matter is there are some improvements that definitely should be done if one wants to consider this approach and so my first recommendation is that: the research department of the Social Security Administration should conduct, as part of its normal governmental operations, the necessary industrial epidemiological studies of industries to provide, on a regular basis every 3 years, the statistical mortality pattern for the corresponding industries by selected categories and types of industries and geographical areas.

This can be worked out in cooperation with all Government agencies, and it can provide the means over time to learn from the past just what did happen to a worker employed in a certain industry.

The second recommendation is one of development. That steps be taken to develop the use of social security disability resource for linkage with industrial mortality studies to provide statistical disability profiles by type of industry and occupation.

The point is that a national system resource on disability exists which can be developed and applied and can supplement as another index the estimation of the magnitude of the work-related disease and illness. Now, I have another recommendation with regard to trade-name products. I would recommend that a national registry of trade-name products with a listing of chemical components be established as a national technique resource for the evaluation of work-related illnesses; the necessary legal requirements be established to bring about uniform compliance for complete data by companies manufacturing the trade name products; that the necessary toxicological data be compiled by appropriate governmental agencies on each of the chemical components; that a system of identification retrieval be established to facilitate rapid response to requests from physicians in practice, relative to the evaluation of medical problems, and made available to the worker through his medical or legal representative as may be required by compensation authorities.

I have only a few minutes left and under my medical services recommendation I have recommended: that all the professional industrial hygiene services, required for the monitoring and evaluation of the work environment be independent of the company, that such services be provided as independent contractors to function with the industrial medical resources.

One final recommendation on medical services and compensation is that workers should be given free choice of physician, medical and surgical, in compensation cases, and that proper safeguards be instituted to protect the medical rights of the worker.

I will add one word and my time is up. I believe that when a standard is in existence and there is a violation of that standard and an employee develops an illness who worked in that location whose symptoms are known to be associated with that toxic agent, that compensation should be made.

I am sorry. I had to stop talking.

Dr. ROBERTS. Shelly, you are going to react?

Mr. SAMUELS. Obviously what I read in Dr. Mancuso's paper was material that supports the position which we take. With the passage of the Occupational Safety and Health Act more than 5 years ago there has been important progress in the identification and control of a number of environmental agents associated with occupational disease: most notably occupational cancer. The advances have come both from epidemiologic studies in the laboratory and the clinic. It is perhaps not too much to say that these achievements begin to justify the assumptions of victims ridiculed and ignored in the past.

A few examples of occupational cancer: lung cancer with coke oven workers, vinyl chloride and angio sarcoma, asbestos-lung cancer, nasal sinus cancer with woodworkers, et cetera.

One of the most important concepts Dr. Mancuso establishes is the long period of clinical latency between onset of exposure, perhaps more accurately effective exposure, and evidence of clinical disease. This silent period between initial effective exposure and discovery of the disease is of more than theoretical interest. It offers an opportunity, a possibility, that intervention during this period might be successful in breaking the link between the exposure of the agent and pre-clinical disease, between this stage and development of early stages of the clinical disease, and between these stages and controllable disease.

While there is no guarantee that this is a certainty or even likely to be the case, we should at least find out if it is possible to break at least some of the links in the chain.

The observation of Schneiderman that we can expect 10,000 deaths of bladder cancer, that half of these lives can be saved by existing methods of early detection points to such a possibility. For these reasons it is suggested that—as a matter of national health policy—intervention in the natural history of occupational disease, to identify and follow what leads we might have now, should occur without delay. Even if that means the creation of a concurrent Federal system of health care delivery. I would prefer that the existing system be modified, but since neither the debate on national health insurance and workmen's compensation really focuses on identifiable high risk groups, and since the debate is politically interminable, as a workers'

representative and as a public health professional, I can only say, "damn you both. We must go on."

Now, what are some of the high-risk groups for which we should be mobilizing intervention schemes? There is some evidence that approximately one-eighth of all deaths among groups of polyvinyl chloride workers will be of hepatic angiosarcoma, and perhaps others among them will die of bronchiogenic carcinoma, brain tumors and lymphoma. Perhaps thirty thousand such individuals are known. And if the incidence of neoplasm response to these significantly increase among polyvinyl chloride fabrication workers, perhaps 1 million workers exposed in the past would be at risk.

NIOSH has calculated there are some 1 million workers currently or previously exposed to asbestos. The largest group which I am sure exists. We could go down the list of occupational cancers and make similar estimates, but of course not with such large groups.

Mancuso demonstrates that epidemiological methods and approaches have already been developed to identify such groups, and it has even been found possible to identify groups of individuals for whom the risk is family or bystander as well as for the individual. Asbestos, vinyl chloride, and lead come to mind immediately. The knowledge of such high risk groups carries with it the simultaneous responsibility of determining whether intervention is possible or at the least of establishing long-term surveillance in the hope of making best use of currently available therapy, and therapeutic advances which may be made.

In the past several years a number of studies have attempted to identify cancer and high-risk groups at an early stage. They have been uniformly unsuccessful. Perhaps the best documented is the long-term study of Stargis in which over 6,000 individuals were followed prospectively with serial X-rays and clinical surveillance. The results were, in the words of the investigator, disappointing.

Similar discomfort has attended attempts for early diagnosis of hepatic angiosarcoma among vinyl chloride exposed workers. Neither available tests nor clinical examinations have allowed diagnosis of this fatal tumor at a time when intervention might have some chance at success. The same is true of clinical observation of workers occupationally exposed to asbestos with very significantly increased risk of death from lung cancer or mesothelioma.

What I am proposing will necessitate an intimate integration of epidemiological, clinical and laboratory approaches at the community level. It is not enough to simply talk of high risk groups, they must be characterized in detail including factors underlined by Mancuso, such as nature of risk, level of risk, dose-disease response relationship, level of effect of exposure, nature and size of population and risk, period of clinical latency, interaction of intensity of exposure and period of latency, effect of such variables as age and sex, and multiple factor interaction.

Not apparent in your paper, Tommy, is the cultural factor that may complicate the validity of the medical history we need. Such as awareness by a father of an early stillbirth and the awareness of a wife of the husband's exposure.

In some instances, such characterization could be made on the basis of published data. In additional instances data may exist in the hands

of an investigator but not published because of a spectrum of reasons ranking from lack of apparent pertinence at the time of the original report, to a simple time lag. Reports of research in progress often need immediate exposure. Data generation and retrieving systems are feasible which would solve these problems. More difficult is the development of systems at community and personal levels. First steps have been taken in a few cases.

In Tyler, Tex. one high-risk group of asbestos workers have been placed under surveillance with serial observation. The group is identified and traced and baseline clinical radiological and psychological studies hopefully will be completed. There is no reason to believe what we now know, however, will make any significant difference in the fate of the 850 individuals concerned.

In the same vein in Louisville, Ky., large groups of current and former vinyl chloride workers have been brought under observation and intensive study. An intensive study presumably is underway. Initial experience suggests none of the available tools provide diagnosis of angiosarcoma and related neoplasms early enough to allow hope for effective treatment. Prayerfully new ones will be evolved in this study.

Now, in conclusion, I can only make these points: Dr. Mancuso's paper is the basis for an important tenet of a national health policy in which workmen's compensation is only a part. While there must be a tie-in with community resources including whatever is generated by the corporate physician, action cannot be restricted to these resources. In the kepone instance, five or more people from the same plant, with the same symptoms were not picked up clinically or reported by the company doctor.

Point: dependence on what is reported by BLS or compensation, or from the kind of defensive research conducted by some corporations, are relatively meaningless at this time for the definition of high risk groups.

An example: in Wisconsin in 1970 and in the first quarter of 1971, not a single case of occupational cancer was reported. Examples of the spurious defensive research might be the Asarco study of arsenic risk or the Union Carbide study of vinyl chloride risk.

Point: existing epidemiological method and utilization of social security data (described by Dr. Mancuso) are sufficient to produce a massive start in handling high-risk groups. The key to this method is notification of the worker that he is in a high-risk group and referral to a resource center. The matching of exposure at work in medical history cannot be left in the hands of the unaided worker, the company, or an unsystematic study.

Point: basic records must no longer be kept in perishable form in the company files, but must systematically be fed into a broader system.

And finally, if nothing else comes out of Mancuso's paper, we can no longer see OSHA, worker's compensation, and national health insurance as separate elements or even a collective total. None of these legislative tools at this time can be welded without cracks into which workers and families in high-risk groups fall.

Workers' compensation historically existed as an incentive to correct conditions. The kepone incident shows clearly this failure. The

Travelers' Insurance Co. inspected the life sciences plant twice, and I don't know what their report says, but according to a foreman, the only change in the plant was a new electric light socket.

Workers' compensation must now be seen as part of the system of economic justice for the worker, cost containment for community resources now subsidizing the employer through assumption of costs and as an integral part of a total health care delivery system that focuses the management of disease rather than alleviation of pain.

In conclusion, the final point I would like to make has to do with the implication of the multifactor situation. The presence of any one factor should be reason to act for compensation or regulation. Multifactor systems are not a reason to act as if we don't know what the cause is. That is because people misuse the term cause. It is not an excuse to do nothing. Approximate identification of the factor may be all that the precision of the subject matter allows. This is what the Greeks in Corinth were trying to say. Thus, a process or a condition is a factor as well as a discrete agent.

Thank you.

Dr. ROBERTS. We are ready for comments or questions from members of the panel.

Dr. ENTERLINE. As you may know, most hospitals participate in some kind of record review operation in which they submit a record of each patient they discharge.

There are two central points: one at the University of Michigan and one at the Pittsburgh hospital utilization project.

The point is there is on computer tape a record of every hospital discharge with diagnosis and time of discharge and it is possible to enter that tape for any particular disease.

For example, I looked at lead poisoning and found 127 cases last year. While I can't get the names of the people, it is possible to find where the cases are coming from. I bring this up as research and more generally to point out the medical care system has organized itself to produce this type data, not only in hospitals but private groups as well. These do produce demographic data that could be allocated to industry and to occupational groups that could be very useful.

Dr. ROBERTS. Any further questions or comments from the panel? [Pause.] If not, while you are organizing your thoughts and reactions to Dr. Mancuso's paper or Shelly's comments, maybe we could ask those in the audience if they have any questions or comments to be offered now.

Dr. BERKOWITZ. I would like to ask Mr. Samuels where he comes out on the question of the role of worker's compensation in light of Dr. Mancuso's paper. Is there a role for the traditional State agency with its limitations of necessity to determine cause before it can pay benefit to any worker?

Mr. SAMUELS. I am trying to see if we are going to continue to play this little game which doesn't exist in reality—whether we will continue to worry about knowing a single cause. Was it his fault or the cigarette? I think that what we need to do, if there is going to be worker's compensation, then obviously there needs to be an economic adjustment when a worker is hurt or when he is disabled by an occupational disease. If we need to do this, then simply working in a

place where a process existed which we know can lead to a disease should be sufficient evidence on the basis of which an award is made. We can't reconstruct for the individual his whole physiological history. We can't worry about whether it was cigarettes or personal nutritional habits or what.

Dr. BERKOWITZ. You would rely on the system but prefer to have some presumptions built into it? You would still think it would be the traditional workers' compensation, that it would be an adequate way to go to share the economic burden and provide an appropriate incentive to correct the situation?

Mr. SAMUELS. I don't think workers' compensation can ever be an incentive, at least in the broadest spectrum of occupational disease. The only thing that comes out of workers' compensation is some economic justice. The fact that a man gets \$36 a week for being fully disabled, I don't think that is a disincentive to the company.

Dr. ENTERLINE. Could I ask—do you think worker's compensation could be made an incentive? I quite agree I don't think the worker's compensation has been an incentive for industry to take any action other than to pay the premium. I think the important question is could it be an incentive in any way? What if the guy got \$360 a week? Are you saying that would not be an incentive?

Mr. SAMUELS. I can only say many years ago I read in the proceedings of the annals of the Association of Political and Social Science, or something like that, a very old paper written by William Green who was, as you know, one of the great labor leaders in American history. The paper was dated in the early part of the century, and he looked at workers' compensation as a means, and he used the word "involvement," as a means of correcting the involvement of the work place.

Apparently, we in labor have failed to make worker's compensation that kind of incentive. Even before that it was looked at historically in the labor movement as simply the means by which a worker could get enough money out of a situation so that he could live.

If you look at the history of the molders union in Cincinnati, they went to court to establish the right of a worker to a safe work place as a condition on which they could go to court and say if the work place isn't safe we should get some kind of an award.

What happens in worker's compensation is the worker signed away his right to go to court whenever he feels like it. The system is so data controlled that for the kinds of disease we have been talking about today he can't be compensated. The worker doesn't know what he was exposed to. These conditions will not change. The worker will not know in the next 10 years either.

We have begged the U.S. Department of Labor to implement a very simple part of the Occupational Safety and Health Act. Whatever records a company makes, whatever data is collected, whatever the medical history is, that this history should be available to him or to his doctor in the case of a medical record. That simple provision has not been implemented.

Dr. ROBERTS. Mr. Sheehan?

Mr. SHEEHAN. Could I take a quick stab at that question? It seems to me there is a consensus within labor that we are reluctant to give

up the no-fault concept of the workers' compensation system. I hasten to say there is growing agreement that we should move out of the no-fault system. I think it fair to say we want to maintain the no-fault aspect of the system, but if the system is to be an incentive to workplace corrections it might be that under certain circumstances that the benefits could be more than compensatory. Maybe in certain instances the benefits might also be punitive.

Maybe in that sense, it could be an inducement, if you could combine the no-fault concept with a punitive award, perhaps the system could lend an incentive to workplace correction.

Chairman BUNN. This whole area we are talking about now gets into the subject, or one of the subjects of the last day, and that is program interrelationship, which will deal with, probably, all these subjects. And rather than try to get further into this, whether the system is adequate or not, I would like to defer this until we get to the program interrelationships part of the agenda.

Dr. ASHFORD. It seems to me there is one brutal fact and that is for clinical occupational disease the workers' compensation system is inherently inadequate as an incentive for improving occupational health.

Mr. KALMYKOW. I don't think the compensation system was to provide economic incentive to induce people to prevent injury. It has had a very definite effect in providing that incentive, but that was not the purpose of the system.

The purpose of the system was to take care of the injured man in trying to provide a financial cushion against the hazards of his employment and injury in his employment and providing medical care.

I happen to know from my own experience, and maybe some of you remember that in Vermont there was an extremely heavy granite quarry exposure and dust disease hazard and I happened to go up there to discuss the possibility of creating a compensation system. At that time the compensation law did not provide any provision whatever for those diseases. If you go up there today you still don't find a silicosis case. I can't help but credit the administration of the law with the improvements in this area.

I think what we have been talking about today is the difficulty of recognizing some of the new hazards which I think are a matter of research. I think we ought to recognize them. I think that is very important. I think as a result of this conference there will be more of an incentive to NIOSH, an incentive to further effort in that area.

And so far as benefits are concerned, I think we should look at the current benefits. Since 1972 the benefits have increased 76 percent countrywide. We are no longer talking about the levels we talked about a few years ago.

There are a lot of serious problems. I do hope as part of this document we will resolve them, particularly from the point of view of recognizing the conditions as they exist.

There is no question they are compensable under the existing law, but how do you find them? How do you prevent them?

Dr. BURTON. We are really very closely related to some of the economic questions that will come up on the third day. I would like to, because this is my theory, I would like to press some of you doctors

here on the medical aspects of this problem because after all that is the title of the general session we are in. I think it would be useful for me if we could get an answer to: If you were to take 100 cases of occupational disease, 100 of disease, which might occur among the working-age population, how many of those could be traced back in an unambiguous fashion to the occupational factor? How many could be traced back in an unambiguous fashion to a non-occupational factor? And how many would you have to say as a practical matter you couldn't identify the cause?

I know it is a problem and I have some sense of the answer, but I want to put it in that form as a way of firming up my own understanding of what is going on.

Mr. SAMUELS. On a hospital ward floor of the 100 cases, perhaps one could be traced back to an occupational cause. But we all agree at this point that is an undetermined proportion due to our ignorance.

And second, perhaps 5, 10, 15 would be traced to some non-occupational cause. And for most diseases, we don't know the cause.

Dr. BURTON. Let's take it one step further.

Dr. ROBERTS. About 5 percent of our disability we label as occupational in origin. That is 5 percent of our employees who are disabled for more than a week.

Dr. DINMAN. I would rather approach it from the way Mr. Samuels suggested. How many can you identify as occupational disease, that is not the question. The question is how many can you identify to any disease causality.

Dr. BURTON. That is what I am asking. How many can you say has no relationship?

Dr. DINMAN. These are very, very difficult to diagnose. That is the dilemma we are medically in.

Dr. ROBERTS. I think now we had best get to the comments from the audience.

Dr. HOWE. I just wanted to ask Tom Mancuso in relation to his last few recommendations, and I know that these have very much application to the problem we are talking about today in workers' compensation, but inasmuch as he included the recommendations, I would like to know a little more about how his thinking goes.

First, there is a recommendation to make the industrial medical operation independent of the company function.

And next he has the same recommendation with regard to industrial hygiene.

I am quite aware that there is an increased tendency for medical departments in the large facilities or headquarters of the company to show more and more supervision over the small plant operations in that medical function. There are currently, I suppose, around 13,000 physicians who do work for industry mostly in the larger companies.

Tom, is it your intent that this is primarily a proposal applied to small plants that do not have the service now or do you look forward to reformation in which we take the medical and industrial hygiene functions out of the company and set up some public administration that pays for the expense and goes into the plant as an outside contractor, and if so, what has this to do with the improvement of the workers' compensation system?

Dr. MANCUSO. Thank you. I will be glad to respond to that.

In the first place, my proposal has nothing to do with public administration. The courts fairly clearly state physicians are operating independently if they are in private practice and in fact if one reads carefully the entire document I don't recall in any place having put in anything relative to the Federal Government or any other organization interceding with regard to the practice of medicine.

In fact, I have leaned in the direction of recognizing the independence of physicians and I am reflecting—both you and I cover the same ground with many years of industrial medicine—from my own experience and so forth, and what I learned or do now—there is a definite change and my proposal is not just small plants, it was for all plants and my suggestion relates to a basic phenomenon.

One is, it must be recognized it isn't a question of being my physician, any physician—I am reflecting what I read and learn. This is not personal in any way. The point is made over the years historically there has developed unfortunately a feeling against the so-called company doctor.

Let's make it clear. There is no question in the world there are suspicious industrial physicians in this country. Let's not have someone come back and say I know that, and probably better than some of you in this room.

The fact is you are dealing with a problem of increased occupational disease. You have to have the faith of the individual whom you are working with. That has been dissipated and has resulted through several decades of abuse. The abuse has existed.

The question comes to mind, that is one point of the matter—the second question comes up. I know from actual experience, not in all plants, but far too many times across the country, where cases are even not being recognized as occupational disease or related to that particular plant during that particular time period. There is no question these things occur.

The point of the matter is, I say that whether the physician in the plant, being a salaried individual is so unique and so different from anyone else, that he would not feel the pressure put on him that the plant can dismiss him in 24 hours if they saw fit. I do not believe that. I believe physicians in the industrial location are just as susceptible to the difficult problems of interpretation of medical diagnosis when ruling on cases of workers' compensation.

The point I am making is you stop the conflict that exists between labor and management at this time. I do not speak for labor. I speak as a research physician. You can resolve this basic conflict between labor and management. I think, by recognizing the industrial medical department as an independent. We will take a long stride forward to resolving so many conflicts that do exist between labor and management related to occupational injury and the difficulties they have had with workers' compensation if we take that step.

I feel very definitely if the physician in private practice, if he stays in private practice, he is not functioning on a contract basis, and you have a whole series of safeguards. He is an independent physician practitioner. He doesn't have to pay attention to anyone. He is independent in his judgment, speaks as a private practitioner, and he can call the shots as they are whether they are or not work related.

I do feel it is time for us to resolve our differences and that, I think, is possible by having a separation relative to the industrial medical program.

Dr. ROBERTS. Could I ask a couple questions? Who would pay the independent practitioner's costs and who could and would find them? At what point could management or labor or at what point could anyone decide they were——

Dr. MANCUSO. This always happens whenever there is a new proposition. This is, of course, not a new idea. Many people have thought of it. I decided to bring it to surface.

Whenever anyone comes out with an idea, the question is what is the exact mechanism and one gets lost in exact mechanisms.

I think it is important to determine whether the idea has merit. I am looking at the point of view of workers' compensation. I feel very definitely more occupational disease will be recognized if the physician is private and the individual goes to the physician with full recognition of the fact this is the situation.

So far as payment, I can visualize a whole series of things.

Right now the company pays for it themselves. The industry pays for it on a contractor basis. Both labor and management. You can set up a new design—all I am saying is this is one step in the procedure to remove the concept and stigma of the so-called company doctor and bring about a process of worker participation and freedom of going to a physician and having the physician independent.

Dr. BARTH. First I think Mr. Samuels may have misspoken. I would like to make certain the record is clear on that.

I think he said perhaps there are a million workers who are and have been exposed to asbestos. My understanding is the number is far greater.

Mr. SAMUELS. Regularly exposed in their occupation.

Dr. BARTH. That is the point I wanted to make. First of all, the source for many of these statistics of the number of workers exposed come from NIOSH. NIOSH hasn't yet clearly defined what exposure, potential exposure means.

If you examine NIOSH's literature, occasionally you see exposed, sometimes potential exposure, sometimes another adjective to discuss the contact a worker has.

And yet, we all know in fact the degree to which a worker is put in jeopardy is faced with something potentially hazardous, it is a global type of number. The point becomes more important when you look at asbestos, which data shows very limited contact with this fiber can, in some conditions, result in a disease of a long latency, 20, 30 years later. We know then only the workers directly involved in insulation, et cetera, but millions of construction workers are exposed to it. Those millions of construction workers turn over very greatly. The construction industry has an abnormally high rate of turnover.

You must consider not simply each worker that has an immediate contact, as an asbestos worker, but the indirect contact occurring. The numbers are far larger than one realizes when you acknowledge the exposure of shipyard workers in World War II and the accumulative value of all workers that have been exposed for a short period of time over the past 30 or 40 years.

I simply wanted to get that out.

Mr. SAMUELS. The point I was trying to make was well-defined high-risk groups.

You talk about the shipyard worker. In another meeting I asked the Assistant Secretary for Health why, since the Government is able to identify somewhat every worker who worked in the shipyards in World War II, why we can't send them a postcard saying: You worked in the shipyards in World War II and a lot of asbestos was in the air, whether you worked directly with it or not. And you are in a high-risk group and this is the name of a resource center near your home that you ought to contact. It is very simple.

And the answer I got, and I didn't get it from him, because he wouldn't answer the question, but the answer I got from the staff was: Think about the amount of money the Federal Government would have to pay if all workers filed a compensation claim. And my response was yes, but damnit they deserve it.

Dr. BARTH. I didn't mean to be critical, but the number is far too low, and it is important to point out they are overlooked in the estimates most of us depend on. That is to say, those now coming out of NIOSH.

Mr. SAMUELS. The Corinthians would have told us not to use any numbers.

Dr. BARTH. In terms of Dr. Mancuso's very thoughtful paper, particularly in light of the length, a couple comments and questions to Dr. Mancuso.

First, the issue of partial disability is not at all addressed by the use of social security data. Total disability might be, but not partial.

Even though it relates to total disability, you are aware social security benefits are thought of as relatively restrictive.

If you read the paper by Nancy Snyder and Mr. Solomons you will see, for example, workers now eligible for compensation under the black lung would not be eligible under the permanent care benefits under social security laws.

To the extent the black lung law served as a model for State laws, evidently there is an issue of how useful that would be to processing that data for pinning down certain risks by occupational exposure.

A second concern I had is that much of the conversation, most of the discussion has been about disease of long latency.

We are mindful there are thousands of new substances each year on the market. I am not being critical, but if one depends very largely on social security, given the length of time before this begins to show up, I think we will be on the wrong track, but I think we will have indicated our points on certain serious problems.

Finally, how to do this statistically. It has been used. One can enter the social security files and point out relative risks related to that kind of work. I can say it is done and it is done very effectively.

I am concerned about entering the social security files without knowing in advance what particular substance or risk someone is searching the files and calling out, and identifying the risk. I am not sure the data will permit us to do that. That is, identify after the fact the risk and point out what specific substance may have given rise to it.

Dr. ROBERTS. Listening to Dr. Barth it occurs to me many of you people in the audience have probably not seen or received the papers

that have been presented and that have been prepared for this conference.

I was thinking particularly of Dr. Barth's that will be on the docket later.

It occurs some of the speakers or the staff may have some extra copies of those documents and may have an opportunity to make them available to the people here in the audience.

I don't know if it is practical or whether the speakers have copies of their own documents.

Chairman BUNN. Let me say we do have very limited amount of the papers for the general public. There are a few papers of which we have additional copies.

What I would suggest is the person who might have an interest in a certain paper might check with Mrs. Robinson and see whether or not there is a certain paper. Don't expect very much. We don't have a great deal of excess.

Dr. AMDUR. I want to ask a question. Dr. Mancuso, you made some comment to confidentiality of records. I would like to ask you what record should be confidential and why?

The second thing I would like to comment on is the so-called company doctor. I practiced for almost 40 years as an independent contractor. I know a great number of so-called company doctors and I would like to make the comment I am sure all paragons of virtue are not in general practice or working for the Government or other agencies.

Dr. ROBERTS. I don't know how many of you share the frustration many of us share. The fact is it has gone past the scheduled time assigned. We will be together, probably many of us together over dinner, and can carry on.

Happily you will note we start out tomorrow with a continuation of this discussion which will run at least for 55 minutes before we light into the next item on the agenda. So with that, I think we will turn it back to the chairman.

[Whereupon general announcements were made and the conference recessed at the hour of 5:30 p.m.]

PROCEEDINGS OF THE INTERDEPARTMENTAL WORKERS' COMPENSATION TASK FORCE CONFERENCE ON OCCUPATIONAL DISEASES AND WORKERS' COMPENSATION, 1976

WEDNESDAY, FEBRUARY 11, 1976

U.S. SENATE,
PRESIDENTIAL TASK FORCE ON OCCUPATIONAL DISEASES
AND WORKERS' COMPENSATION,
Chicago, Ill.

The Conference met, pursuant to notice, at 9 a.m., at the University of Chicago, Center for Continuing Education, 1307 East 60th Street, Chicago, Ill. J. Howard Bunn, Jr. J.D., director, presiding.

Chairman BUNN. Two people this morning will be joining us in one capacity or another on the agenda. One will be Dr. Marilyn Hutchison from NIOSH. Dr. Hutchison works with the Director of NIOSH and will present Dr. Osterritter at the appropriate time for his part of the program.

The other person is Mr. Ralph Mueller, who is seated to my right, and he will be representing the Secretary of Labor since the Assistant Secretary, Mort Corn, had to leave.

At this time I will turn the program over to the moderator.

Dr. ROBERTS. Thank you, and good morning. We have a rare luxury this morning that you don't get in most meetings, and that is an opportunity to talk a bit about what happened yesterday before we dig into today's work.

I am sure what did happen yesterday caused enough reaction in many of us to want to speak up about it.

According to the agenda we have, the panel has the first opportunity to express itself.

Dr. DISCHER. I think it was apparent yesterday that the medical side of the House wanted to get a point across that diagnosis of the disease is different from identification and causal factors. And, I think it was rather obvious from the standpoint of the lawyer in a workers' compensation system, the causal factor is important, not just simply a diagnosis. And those of us who work with causal factors on a regular basis are impressed with the need for exposure data.

And in fact, the probabilities that are assigned to causes are to a great extent based upon the diagnosis itself being consistent with what we know that particular exposure would lead to. At least where we have strong presumptions in those directions.

I think secondly the point a few of us wanted to make yesterday was that most physicians who complete first injury reports do not

have to deal with causes as a routine part of their practice. Diagnosis in fact does not generally include causation, if an effective treatment can be carried out without getting at the etiological data.

There are a few exceptions such as an infectious disease where it is almost routine to get the causal factor.

The recognition problem is then partly a problem of the untrained and unpracticed physician who does not routinely diagnose by cause. If a physician is not oriented that way, we would not expect to be able to persuade him to move into an occupational history, which he really needs to do the job right.

He doesn't know much about the exposures in plants and doesn't know much about the meaning of them. He doesn't know what to do with the data even if he had it.

Therefore, focus ought to be on how physicians do understand it—can get into the picture. In fact, I think that was one of the essences of the proposals, the recommendations made by Dr. Mancuso, and I think there was an element of the same thing in Mr. Samuels' presentation. There aren't many such physicians in the United States and I think it was proposed rather nicely that the high risk group, at least, should be funneled to places where they are.

This would in fact, from the standpoint of the lawyers, yield a sharp increase in the number of cases and therefore costs. This increase in yield, however, would be associated with an increase in validity.

Therefore, one would be dealing with much less bothersome costs or negative costs, if you will.

The element I think was dominating yesterday is getting through the processing in an expeditious fashion, and I was a little confused and would like to hear more from the lawyers' side of the House on what they meant by presumptions in such instances as were cited yesterday.

But, I would like to indicate that the establishment of a special group dealing with—special group of physicians—dealing with high risk groups, would not be interfering with the doctor-patient relationship, since the bulk of their interest is in non-occupational diseases anyway.

Yesterday there was also a great deal of discussion about the epidemiologist and his role, and identifying high risk groups. I wanted to make the point, this role of the epidemiologist, and when I play it I do the same thing—I am not interested in the individual patient. At that point I am concentrating on the group, and in fact, this kind of information about the group as I indicated previously, is sort of probabilistic data that we use.

However, in the actual processing of workers' compensation claims, we go beyond the group and get down to the individual. And, we must recognize a number of the data systems an epidemiologist will call for, such as the Social Security Administration and the like, actually will have diagnostic data without cause in there. That is the reason why one is not looking at occupational diseases in the Social Security Administration or any of the other systems. The original physician had in mind something other than cause. He had in mind application of the expected disability or the like, or filling out a death certificate in the broadest sense, not identifying a specific cause.

The quality of the diagnostic data to an epidemiologist is important, and going into some of these data systems that were recommended yesterday from the standpoint of quality, will reveal there are some mitigating factors that need to be taken into account.

I would like to go on to the problem of guidelines for standardizing diagnostic procedures.

It was mentioned yesterday in medical surveillance we need to develop guidelines for the medical surveillance procedures, and I will go one step further. We better get guidelines also for diagnoses, so that we are using the surveillance procedure in a relatively standard manner and funneling cases we find on the basis of as early as possible into the workers' compensation system.

Now, the next element in my comment has to do with the role of workers' compensation in preventive medicine. So far I think the role has largely been an area of medical services or assistance, governmental assistance in the provision of medical services.

I think it is true that little has been done by Government to legislate the practice of medicine in the surveillance requirements thus far set up by the Government, the guidelines for surveillance, the guidelines with respect to standards of practice have been pretty well shunned. And, as a matter of fact, I think they deferred to the professional associations to develop these guidelines. Little has been done and I think we need to recognize that.

There also has been little done to identify the specific workers who are at risk in a manner such that a system for surveillance could be provided. I believe that this may be a governmental role, and may be a role that workers' compensation bodies within States could play a role—particularly with respect to the credentials of physicians that are participating in this.

Obviously we, as a researcher, I am talking about some research dollars that would be needed to develop such a program within the context of workers' compensation. I think we would want to then not only have the epidemiology needed to define risk groups, but some medical care research to make sure the quality of procedures are reasonable, that the interpretations that are taken are consistent with procedures and guidelines, that the information is used to communicate to the worker—and I think this is one of the most important—to communicate to fellow workers who are at risk who do not have, presumably, the occupational disease—that it is communicated to government who can develop better exposure data and better diagnosis data, and to make sure it is communicated in individual cases where disease is found under the workers' compensation part of the House, to make sure things are handled expeditiously.

This puts workers' compensation, I believe, in the prevention business, not just dealing with those already found, and in fact, I would even propose you consider paying for this through workers' compensation.

This would be a very dramatic change in the orientation and I don't expect there would be widespread approval of this kind of direction since there are many problems within your own shop that you are struggling with that you may feel are more important.

But, I believe in the long run this would be the most dramatic move workers' compensation could make in this decade.

The last thing I would like to comment on is the apparent vexation you are having with chronic delayed cases. You are not the only one. I don't think you are going to solve it in this decade, but I would like to hear more about the legal mechanism, such as presumptions, that presumably might change the way such cases are handled, once we have at least a hint they are coming into the systems.

Dr. BURTON. Thank you, Dave. Irv Selikoff.

Dr. SELIKOFF. I would like to proceed along the same general lines that were so well laid out now by Dr. Discher.

Yesterday we heard from Shelly about the question that is now before us concerning the possibility of intervention in the, what Dave calls, long delayed cases; people with diseases, potential diseases of periods of long clinical latency.

Nature gives us—first of all, nature has thrown a curve at us by having diseases where the cause and the clinical effect are 20 or 30 years apart. By the same token, it does give us a chance to perhaps intervene in some way during that 20- or 30-year period; perhaps with much earlier diagnosis. Perhaps with early detection; that is early detection of latent disease which is what we do now. But, in any case, this question is now a practical one before us, and Shelly was correct yesterday in calling our attention to it.

Now, where does workers' compensation take any responsibility for what is occupational disease at that point. And this is now the question Dave has given us. Does the presence of an individual in a high risk group give us any responsibility toward him. He is not the same individual. He has been changed. There is potential for disease within him that would not be present if he were not in this high risk group. If he had not been exposed to beta-methylomine or benzidine. He would not have the potential which can be considerable of developing bladder cancer.

We do know companies do accept responsibility for this man in a sense. For example, of regularly examining his urine pathologically to see whether cancer cells are appearing, and some even will advocate a regular cystoscopy. So, the companies have accepted responsibility; and the question in my mind is whether the workers' compensation system also then has a responsibility of some type in this regard.

Yesterday Jack Finklea stated—and nobody picked him up on this—stated that, in answer to some comment, well, if a man's employer goes out of business—let's say an asbestos worker's employer goes out of business, we, the Government, will undertake to maintain surveillance of him from that point on. So, someone, in this case Jack points out the Government, someone accepts responsibility for maintaining surveillance of a person because he is simply in a high risk group; he has no necessary disease or necessary disability at that point, but someone is going to take the responsibility if the employer goes out of business.

Does this mean then no one has the responsibility if an employer doesn't go out of business? Does the employer have responsibility? And if he does, does the workers' compensation system, as part of this system of employer-employee occupational disease relationship have the responsibility also?

These are very real and important considerations and bear on the man's health and possibility of survival, because if he is under surveillance, there is the chance of survival—a better chance for survival—that he might not have were he not under surveillance.

For example, if it has been demonstrated in New Orleans that people working as sandblasters under unprotected conditions in shipyards there have an extraordinary chance of developing serious or fatal or acute silicosis, rapidly progressive silicosis, is that man once he is exposed as a sandblaster in those yards kept under surveillance or not? Because he has a better chance of survival if he is and knows he is at risk. He may even, for example, get a TB vaccination to lessen the chance of developing tuberculosis. He will be treated for his occurring infections by physicians much more readily if they are aware of his underlying pneumoconiosis, or risk of it, than if they were not.

This has to some extent even been recognized in one part of the workers' compensation system, that is the Federal Bureau of Employees Compensation, which has agreed with some constraint—that if a diagnosis has to be confirmed—and there can have been no other asbestos employment afterwards—has agreed to pay compensation for mesothelioma that occurred in the Navy shipyards in World War II. The Navy would then consider itself the last employer.

Well, if they have accepted responsibility for payment on death, does that mean they have no responsibility while the man is still alive? Do we pay only workers' compensation on death or is there also a responsibility during life?

Now, if there is that responsibility, does it not include surveillance, and as Shelly stated, intervention, especially when such intervention and surveillance might increase the chances of survival.

We often see this in workers' compensation, for example, many awards given with the stipulation that not only is a cash payment to be made, but medical costs for supervision of that worker are to be borne by the employer.

So these are new questions before us with long history and within the current workers' compensation system, and I suggest the questions Dr. Discher has just placed before us and Shelly placed before us yesterday are very real ones and worthy of your consideration.

Chairman BUNN. Let me react to a couple points both Drs. Discher and Selikoff made. Insofar as responsibility for surveillance; the only way I can envision in any way this is likely to be done at the present time are under a couple of circumstances.

First of all, is getting the case into the system. If a claim is filed with the compensation agency, even though there is no disability, I think it is reasonable to think the medical bills perhaps could be paid, once the case is filed. This would vary from jurisdiction to jurisdiction, and if you can show the man had medical problems related from occupational disease—he might not be entitled to any compensation because there might not be any wage loss.

Insofar as detailed medical surveillance, there are a couple of possibilities that come to mind. One would be, and this is something that would have to be developed due to the relatively new input relating to long term, or late long term latency periods, and that would be to try and develop a mechanism to monitor within the compensation system

on a reasonable basis, those who have been diagnosed early as having some type of long latency diseases, that maybe the actual disability may be 20 or 30 years from now.

At least I think it might tend to pick up the medical part and hopefully would track what the man's physical condition is.

Those are a couple things that come to mind, and perhaps some of the other people may have some comments on that.

Dr. ROBERTS. Mr. McMahan?

Mr. McMAHAN. Again, I think we are dealing with two separate problems so far as chronic latency. One can be handled with the present compensation mechanism, and the other possibly can't without some drastic changes.

The first is the case of the cumulative exposure of a number of employees such as in coal mining, for example, where the disease manifests itself, or perhaps I should say the disability manifests itself while the man is employed by someone. A series of employers or cumulative exposure is not an impossible situation to deal with if you start from square one and everyone in the string of employers knows he is potentially exposed to a claim by an older employee, if he hires the employee at age 60 who had an exposure from age 18, because there the industry can treat that, the employee's labor as a pool, representing a predictable risk.

And assuming all employers have their share of old and young employees, with lesser and greater exposure, that is insurable, and the man can be compensated with, on the principle say of last operator, last responsible operator. Those operators, whether or not exposed in their particular business, actually caused the disease or contributed to it, can insure against that. The greater problem is the case of, I think Dr. Selikoff is really addressing himself to—the exposure to—the exposure that manifests itself 20 to 30 years later, after the employee may have been out of the work force entirely, was not further exposed, was not earning income, or was earning income in a completely safe occupation.

Present compensation mechanisms to my knowledge do not deal with that, and I think it would be very difficult to adjust them to deal with that, without departing from the concepts of workers' compensation, which is incidental to the contractors' relationship between employer and employee, and designed primarily to replace wages lost because of disability.

Medical payments, treatment and continuing care really came later in compensation, and perhaps some of the people here—Mr. Lewis is more familiar with the mechanics of compensation—could expound on that.

But, unless we could go to some system of identifying the exposure at the time it occurs and knowing that the odds are great or certain that 20 or 30 years later the person will be ill, if we could do that, then conceivably we could adopt a situation where you set aside a reserve or trust for that employee that would travel with him the rest of his life until the disease occurred. Perhaps, as has occurred in the past, just through the operation of the economic system, when the exposure, the risk is known—those are high-risk occupations—if the employee is aware of it, the employee theoretically will bargain

for a high wage, or will somehow economically account for the possibility in the future, due to the exposure, his working ability will be diminished or his health care costs will be greater.

Another alternative is to prevent the exposure, either by eliminating them, if that is possible, or eliminating the industry wherein the exposure arises if eliminating the exposure in the industry is not possible.

Or third, by restricting the time that an employee can be exposed in that particular occupation. I don't know whether that is acceptable—the last would be acceptable to the labor movement. I would be curious to hear some comments on that.

If there is an unavoidable exposure in an industry, are we prepared, in effect, to sacrifice the worker to disease, the unavoidable disease? Does the worker have a right to expose himself to this disease in his labor, and a right then to claim benefits for treatment of it after he does incur it?

Dr. ROBERTS. Mr. Kalmykow?

Mr. KALMYKOW. I would like to comment on that. I think it depends on what kind of law you had at the time the exposure took place. But in all but three States we have broad occupational disease laws today, and if a man is exposed to any one of these conditions today, and most States provide he can make a claim within a considerable—2 years, 3 years, after discovery—so that in a case of that type then, 40 years from now, whoever was insuring that employee at the time of exposure is liable.

Or, if the employee is self-insured, he is liable.

There is no question of recovery. The only difficulty may be, you find out, whether 40 years from now he gets whatever he may get, I don't know, cancer, whatever, and you trace it back to some exposure 40 years ago, depending on how long it was, and records of exposure may not be present—some of the problems we were discussing yesterday.

But, so far as entitlement is concerned, he would be entitled to compensation assuming all parties can show a financial condition to pay it. That is why with some of the problems we are discussing today, they are important, because I was a little bit troubled by the figures thrown out yesterday, because it was so nebulous, whether it is 50 percent or—any substantial amount, of these cases, for which you have present liability, although it is interrupted—you have a problem on your hands.

Dr. ROBERTS. Let's go to some questions from the panel before we turn it over to the audience.

Dr. LASSITER. Two points, first to Mr. McMahan, a question concerning standards.

The policy in OSHA concerning standards to relate exposure to toxic substances is such if the exposure occurs, if there is a risk associated with exposure to the toxic substance, and this is keeping in mind toxicity and hazard are not synonymous terms—but if a substance is used and there is toxicity or carcinogenic response to that substance, as long as it is used, regardless of how it is used, there will be some risk associated with that usage. And, as a general policy, we cannot eliminate the risk under those circumstances; we can minimize it.

But, as long as the substance does elicit a toxic or carcinogenic response, and it cannot be banned—and of course that would be the only way to totally eliminate the risk—there will be some risk to the worker associated with the usage.

Now, getting back to another comment that Dr. Selikoff raised, and tying this into Dr. Finklea's response, as long as the employee is employed and we have a standard that has been promulgated with the medical profession, of course he will be kept as a person in a high-risk group because he was exposed to that substance under surveillance.

At the time of the employer going out of business, those records, of course, will then be forwarded as Dr. Finklea said, to NIOSH.

Except under circumstances for etiologic research, because of other constraints, NIOSH does not routinely take over the surveillance of that worker unless it pertains directly to a standard promulgated by OSHA stating records must be sent to NIOSH under those circumstances.

There are circumstances under which NIOSH may well pick up, as research tools, the followup work of employees in high-risk groups.

Dr. ROBERTS. Jack Sheehan.

Mr. SHEEHAN. Jack Sheehan, with the Steelworkers.

Without relating to the question as to how the compensation system will pay for the benefits for those whose disability appears at some time in the future, I would like, however, to comment on the suggestions, the three suggestions that Mr. McMahan drew up.

One had to do with high-risk wages, the other elimination of risk, and the other to restrict the time of exposure.

It seems to me that since the promulgation of the Occupational Safety and Health Act, there was incorporated in that law the fact that the standards will not allow a reasonable time for exposure and then withdrawal, that the standard has to be based upon the fact of the worker's lifetime exposure in the work place, and that the standards then must be promulgated on the basis of the fact he will be in there for the 30 or 40 years, and not a standard that will say, take him out after 10 years. I think that we have felt that the enactment of that law has given a statutory right to the workers to have the work place in such a condition that he, the worker, is expected to be in there for the period of his working career. Whether our standards fulfill that obligation is, of course, a matter of contention, but certainly we feel the statutory basis is there.

Another point that was made was with regard to elimination of risk, and Mr. Lassiter's comments I think in response to that—it seems to me to be one in which we are advocating standards that will eliminate the risk. Now, I guess there is some dispute as to whether risk is eliminated if you insulate the man from exposure or you eliminate the emissions through engineering controls.

Here, of course, is again an area of controversy. The labor movement would certainly opt for and urge it be engineering controls to prevent the emissions of the toxic substances, dust, and fumes that are causing the disability. However, I assume that OSHA and perhaps NIOSH may say in some cases that might not be possible, and, therefore, are advocating a protective type administrative control.

But here, I think, however, the concept is though, somehow or other

the risk should be eliminated, and whether the workers' compensation system can help in that, I don't know. I would like, however, to hit on the head the concept of high wages and high-risk industries.

Now, let me hear from the steelworkers—George Becker may comment on that—but certainly maybe in the past there was some tacit or maybe open acceptance of that concept. Although, our bargainers may have felt we did not bargain very well for the so-called high-risk people, and that we should have gotten much more, but, I think that notion now is or should be discredited, that we will not accept, or should not accept through collective bargaining agreements high wages for high risk as adequate compensation for receiving the injury some time, either in the present or in the future.

Thank you.

Dr. HOWE. I am Dr. Howe again from the American Medical Association. Thank you, Mr. Chairman, for the time. I am reverting to Dr. Mancuso's paper yesterday in a couple of respects.

You heard me question Tom yesterday on the proposal of separating the medical and industrial hygiene and nursing profession from their frequent salaried relationship to industry and business within the corporate structure.

He believed, and I am sure quite honestly, the fact that some physicians—what he calls company doctors—take the side of company in the adversary disputes in workers' compensation litigation, and that that warrants abandonment of the in-plant company medical department.

He wants to substitute for such medical department within industry a system in which health provisions withdraw apparently into an independent contractual relationship with no ties to either labor or management. Thus, idealistically, becoming unbiased, free agents in the disputes.

Dr. Mancuso is not the first physician to propose this, and Dr. Irving Tabershaw has held this position, as some of you know, for several years.

You will remember Tom Mancuso answered my question by recommending this change be made not only in the small plants around the country, but also in the large companies.

I would like to make some comment suggesting that to make this change across the board might actually throw out the preventive medicine baby with the bath water. His proposal would in fact, destroy many of the gains occupational health has made during the past 40 years, in my humble opinion.

Some studies I have made suggest an increasing number of occupational physicians have begun to work in community group practices and clinics. They do furnish what could be called unbiased services to small employers in their community as independent contractors or consultants. This is a progressive development in the unending battle to get occupational health services to small plants. I support this trend as a practical method of delivering preventive services to small plants.

To this extent I agree with Tom Mancuso, but I have serious objections to destroying in-plant medical and industrial hygiene departments in large industries. The resources these departments have provided voluntarily over the years to research in toxic hazards, to

such services as alcoholism programs within industry, and to medical and nursing surveillance of employee protection against safety and health hazards—have been prodigious. Many companies through this type of service have done more to protect the worker, as have the sometimes faltering and inadequate resources of university research laboratories and outside consulting services.

Such organizations as the Academies of Occupational Medicine and Industrial Hygiene, the American Occupational Medical Association, the American Association of Industrial Nurses, the American Society of Safety Engineers, and indeed, the National Safety Council, could scarcely have been founded without the active support of large industry.

Institutions like the Du Pont Laboratory, the Industrial Health Foundation, the accreditation of occupational health programs of the Occupational Health Institute, and the certification in occupational health of the American Board of Preventive Medicine, could scarcely have happened without large industry support.

The movement for professional stimulation of rehabilitation of injured workers has proceeded out of industrial medical departments for the most part.

Should all these resources be thrown overboard just to erase the stigma of the company doctor?

Now, the relevance of all this to workers' compensation is more or less as follows:

We all, as professionals dislike some of the characteristics of the adversary system. Personally, I have no fear of the adversary system. It is a necessary part of our legal structure. It represents our way of deciding individual cases, particularly complicated cases of occupational disease awards on the merits of the individual claims.

At times professionals do become involved, perhaps unjustly, as advocates of either the plaintiff or defendant. I have long recommended that labor unions should hire physicians and industrial hygienists to represent them in the same way that companies do. Some of them have already done this. This is the best way to get equal treatment of disputed claims.

But, I am strongly opposed to destroying the resources for preventive medicine, nursing and hygiene, offered by large industry and business just to produce a so-called unbiased class of witnesses. That course, in my opinion, would set our constructive inplant preventive health services back half a century.

Thank you.

MR. CLARK. I am Howard Clark of Federal Insurance—I would like to talk a bit about the long-deferred liability. We have just come through, and I mentioned this briefly yesterday and will mention it again—it seems to be quite pertinent—we have just come through a shattering experience in respect to medical malpractice responsibility, and the problem here results from the so-called long term. I am sure Mr. Johnson will confirm all this. His company had a certain amount of experience in the field. But long term, and this results from the necessity of the actuary to figure out rates calculated to come home in claims some 10, 15 years hence.

Now, if we are going to expand the workers' compensation system to encompass these long deferred disabilities, where fruition of the disability comes about after some 20 or 30 years, then we are going to have to develop rates that are calculated to pay these benefits this long distance in time.

Now, this seems to me to make the long-term medical malpractice kind of pale into insignificance. We have to think of recommended but not reported legislation that is going to be set up to handle these liabilities in the future. We are going to have to think—Mr. Kalmikow quite correctly stated—that the policy that was in effect at the time of the occurrence is going to have to pay the benefit when they come to rest.

Now, just recently the A.I.A. and other organizations experienced this in the medical malpractice field.

This long term made it an unreasonable risk except on the basis of the claims made concept. A thoroughly different concept, and I won't go into it now.

I think these are concerns we will have to give a whole lot of thought to in this environment and I regret to say I don't share Dr. Howe's enamored view of the adversary system.

It seems to me one of the gentlemen yesterday begged we not do away with the no-fault concept. Well—agreed. It is a no-fault system. But, on the other hand, workers' compensation is a highly adversary system and it doesn't seem to me to make a whole lot of difference whether the adversary nature of the system arises out of the question of fault or question of causation.

Dr. ROBERTS. Shelly Samuels and Dr. Mancuso would like to say something before we go to the next subject.

Dr. MANCUSO. Thank you. This will just take a minute.

Dr. Howe in presenting his reaction to certain recommendations pertaining to separation of industry medical services—I can respect a need at times for someone to present a different point of view—but what I object to strongly is the distortion of the purpose and intent of the recommendation made.

In no way was there any mention about destroying company medical services, or destroying preventive measures, or destroying actual resources which exist. The opposite is the purpose of the proposal I made.

The preventive aspects of industrial medical programs, I am sorry to say, over a great many decades, have not existed at all. There have been a tremendous number of areas of deficiency, and a tremendous number of areas of improvements.

This does not in any way say we do not have excellent services, but my concern is, however, there is a great need for improvement.

Dr. BURTON. Shelly?

Mr. SAMUELS. I will be very brief. It is addressed to a question Mr. McMahan raised, and I think has to be answered, and that is the question of whether a worker has a right to accept a risk and accept the consequences.

And this is an ethical question and it isn't one I answer because I represent workers.

(A) The question assumes of the worker unobtainable conditions: 1, total knowledge of the hazard; 2, a total understanding of the risk; 3, total choice for himself or dependents, future and present;

(B) The question assumes of society it can permit individual workers and individuals in the company to threaten survival of the individual, and the social group, by creating an uncontrollable process or regression to cannibalism.

Mr. McMAHAN. Could I respond to that?

Dr. ROBERTS. Yes.

Mr. McMAHAN. I think Mr. Samuels misunderstood the import of my question. Perhaps I could put a hypothetical to every interest here. Because, I am not sure to what extent we are talking about preserving life and health and to what extent we are talking about money.

What I was thinking of, let's assume we have an occupational category where the risk is inevitable. That you can determine through specific exposure, say after 10 years, a disease will develop and after 20 years there will be disability. But, after 5 years there is no harm.

What would all of you say to a Federal law for example that said no one can work in that occupation for more than 5 years, period? Would that be acceptable?

Do the medical people think the primary goal is to protect people from getting sick?

Do labor people think men have a right to work until they get disabled, and would resist that kind of legislation in favor of a law that says you can work until you become disabled as long as you are fully compensated for that disability?

That was my point so far as a worker's right to knowingly expose himself to a risk.

Dr. ROBERTS. I am sorry, we probably should progress our program. We raised so many questions, I am sure we all feel somewhat frustrated. I feel particularly frustrated in the constrained role of a moderator, in not being able to react as I would enjoy reacting to some of Dr. Mancuso's—the implications of Dr. Mancuso's proposal. But, I do believe we should move on.

It says in the program I am inclined at this time to offer somewhat of a summation. You have all been in the room as I have, and you have heard it, and it would be presumptuous of me to try to interpret all of the controversial things that have gone on.

I am not pleased and I am sure none of us are with the extent to which we made substantial progress in our key question of trying to decide how we can really come up with recognition of the contribution of a man's work to either the initial causation of occupational illness or of aggravation.

I am not sure, after hearing some of what has gone on, we wouldn't almost simplistically feel maybe there is no future for workers' compensation, and maybe we are dealing with some insoluble problems where a whole system would have to be very vastly changed.

I think all of us would acknowledge it shouldn't be the worker that pays for a disease that results from his work. We are naive if we think there is anybody to pay except all of us. There are only us chickens here to pay. And the question is what would be the best mechanism of distributing the cost of occupational diseases and still retain an incentive that is totally effective or as effective as we can have it, to get

employers to discontinue any practice that results in occupational disease.

Now, we are going to perhaps get a little additional attention to the key points from the part of the program that is to follow. Before Dr. Osterritter discusses his product, we would like to ask Dr. Marilyn Hutchison to say a few words. Marilyn, in addition to other balls she had in the air at the time this program was initiated, was its program officer. Marilyn?

Dr. HUTCHISON. I just wanted to say a couple words as introduction, not so much of Dr. Osterritter, as to the project itself.

This conference, I think, highlights very well many facets of the difficulties, difficulties of relating disease to occupation in a compensation system that is geared to deal with physical injury.

The contract Dr. Osterritter is going to discuss is an outgrowth of a number of meetings NIOSH personnel have had with the Task Force and with outside consultants regarding the feasibility of developing some kind of guideline that might be helpful to those persons that either persent or evaluate evidence concerning occupational disease. This project is a first attempt to develop such guidelines by outlining one method of establishing appropriate evidence in a logical manner along with some examples.

In order to meet the particular reporting needs of the Task Force, this contract had to be completed in 5 months. And that required a great deal of work on the contractor in what I think you will agree is a very short time frame for an effort of this sort.

The report is still in review. Those of you who have received copies know that this is not a polished document. There are still some errors and inconsistencies, it needs a little editing, and so on. But, we are presenting it at this time anyway as a working tool in order to get your input.

How often do we have a chance to present a project report to a group that has as much expertise as we have gathered here today, who understands the problems, and understands what it is we are trying to do? So, I ask you at this time to consider the project seriously, as I say I am sure it has many defects, but give NIOSH the benefit of your comments and suggestions.

Is the concept valid? Is it worth pursuing?

If not, what alternative would you suggest? If so, how can the guide be improved so it will help physicians and State agencies and other people who are involved in assessing the probable work relatedness of the disease.

I think that is all I want to say and we will get on with the main event.

Dr. ROBERTS. Doctor Osterritter?

Dr. OSTERRITTER. This guide is a product and joint effort of two occupational health physicians, two industrial hygienists, an experienced occupational health nurse, and a technical writer—with some assistance from an insurance claims adjuster.

Our assignment was to develop a guide that might be helpful to State compensation personnel, hearing officers—perhaps judges, lawyers—and physicians not familiar with occupational illness or disease.

I should like to point out at this time that the majority of physicians are not familiar with occupational health or diseases. Nor in routine physical examinations do they ask about an individual's occupation. The purpose of this guide then is to assist these people in making a determination between an occupational disease and a nonoccupational disease.

Our first reaction concerning the project was it was an impossible task. You may agree. Perhaps we should have stopped at that point.

You will recall yesterday that we supposedly professionals could not agree on an exact definition of an occupational disease. We went through many of those gyrations—theoretical, philosophical, occupational disease, environmental disease, multiple factors, what caused diseases, why does it occur in some and not others—we struggled with a long latency period. We were on a very negative course.

The claims adjuster brought us back to reality by reminding us there already is a system in operation that the people working indeed do have. Why not provide assistance now, if at all possible, to perhaps make the present system more effective while looking for a better one which we agree may take years. And who knows at this point. The new system makes light of those challenges where hopefully lawyers and physicians may be asked their advice.

I ask you to mentally remove yourself from this ivory tower. And move to the usual dingy rooms where compensation hearings are conducted. There is usually a hearing officer, maybe the claimant, also two lawyers, maybe two physicians—frequently all these people are not present at the same time that depositions are taken. One side says a claimant has an occupational disease. The other side says he doesn't. Somehow the hearing officer must make a decision. It is this group to which the guide is directed.

The compensation mechanism usually starts in operation when a complaint of illness or disease is made to management by an employee, a company or personal physician, a lawyer, union official, or through epidemiological evidence of a health problem.

I should like to make it clear we attempt to develop a guide to aid in ascertaining only if a disease or illness is occupational in origin or nonoccupational in origin, and not if it is compensable.

Briefly the guide follows a logical pattern an occupational health physical should pursue in a practical case. We could not dwell on the philosophy of occupational disease. We proceeded on the premise any illness or disease contracted or produced by the work environment was considered occupational in origin. Emotional or mental diseases per se are not included.

The guide starts with a complaint and investigation and analysis of that complaint. A person's social, family and occupational history; physical examination; the routine laboratory, urine, blood chemistry or B.B.C. differential, et cetera—specific laboratory information such as X-rays, pulmonary function studies, special bladder studies—a total medical evaluation, if you will. It includes then a complete thorough industrial hygiene evaluation of the workplace. Toxicology and epidemiology—what is available in such situations.

We worked on the premise an occupational disease exists if there is evidence of past or present exposure to an agent or agency sufficient

to have caused the disease and the medical findings of the disease are compatible with those produced by the agent to which a claimant was exposed. If these criteria cannot be met, the disease becomes a non-occupational disease.

There are all kinds of extenuating circumstances and exceptions, but through this process, at least, proper questions, we hope, will be asked and proper tests performed, so that whoever must make the decision, will at least have the proper material for making a decision.

Midway through this thing I wondered about it and as a trial run I asked a lawyer who deals in compensation cases and a union representative—each different cases—to try to this methodology in preparing a case. Both did and found it promising. This gave me an incentive to at least continue.

The guide contains 15 specific substances that were assigned on which to use the conceptual approach. I will not go into these 15 substances. They are not important. There is a discussion section of aggravation of preexisting conditions. I still do not know what they are. It is truly a difficult medical subject.

I was interested to learn the word "aggravation" did not appear in either Gorman's or Stedman's medical dictionary.

It contains guidelines for assessing qualifications of competent medical and industrial hygiene personnel. Lawyers were not included because there was none from the task force, but they are not immune. Actually, if any system is going to work much depends on the personnel involved; their integrity and impartiality. These are key factors. Utopia perhaps, but for any system to work, these factors must enter into it.

The guide contains toxicological information; jobs where exposure to the 15 specific substances may be encountered; a monitoring of normal physiological values, a bibliography, and a glossary.

Now, there are some who will feel such a guide is not necessary or oversimplified. Others will disagree. I am sure NIOSH is open for constructive suggestion from anyone. Thank you.

Dr. ROBERTS. Dr. Amdur? It is interesting that Dr. Osterritter produced a production of about 240 pages long and he made the briefest presentation.

Dr. AMDUR. I have looked long and intently at this report. My first reading of chapters 1 through 4 has evoked no tranquil response, and especially since I noted that Dr. Osterritter, like myself, identifies with New York State, I wondered if he experienced some of the same gut feelings in writing as I did in reading the guide.

Let me digress to offer you this rather simple parable—a metaphor not entirely unrelated to the matter of guides. It is somewhat like taking testimony from the little red fox and from the resident chicken as to how things are going in the henhouse. For some it couldn't be better; and for others it couldn't be worse. A decision ultimately reached as to the henhouse status had less to do with the facts than with the emotional fantasy of the testimony. It seemed to reflect the need for increased protective surveillance of the henhouse and for other devices to reduce and lessen the presence of the fox. The official opinion reflected the personal attitudes of the judge, who had incidentally made up his mind as to the issues even in advance of the

testimony. Unfortunately, in the process of making the chicken secure, the matter of egg production was ignored. The farmer soon found the entire operation not productive and, lacking the economic reward, he closed the henhouse and advised the occupants to seek employment elsewhere.

The lesson of the parable speaks to the concern and interest of all in the matter of even-handed decisionmaking not only for the active participants to that process but for the general public whose interest may be reflected on the economic impact of the decision made.

Perhaps I was not a good choice to discuss this guide. In New York State we are in compliance with 14 of the 16 recommendations of the commission. Perhaps this discussion by someone from Alabama, Louisiana, or Kansas might have been more productive.

By the time I read these chapters again I knew that neither indignation nor gut feelings would serve the purposes of this conference. I realize that the guides were not intended to admonish or to praise the efforts of any State. So, admiring Dr. Osterritter for keeping his cool, I set about to make the following comments.

In a general though specific fashion, the guide satisfactorily addressed the problem of decisionmaking in situations where exposure is adequate, clinical history and adjunctive laboratory and epidemiological studies compatible with exposure. The illustrative cases too are satisfactory. Not so in those gray areas where exposure may be uncertain, inadequate, or coincidental, where clinical evaluation may be compatible with, but not indicative of exposure, and where the level of disability is less than total.

Guides may be an unnecessary luxury for the obvious. Where the shadows are heavy and oppressive, and life is furtive and scant, the need for a guiding hand is essential. Although the volume of material in the guide and in the appendixes is considerable, it is already available to the interested in many source materials. It has been my experience that the competent specialist in occupational medicine does not need it, the general practitioner and other major providers of service will not use it, and finally, the administrators tend to ignore it.

At this time I might comment that there is usually nothing much wrong with the substance and intent of most legislation. Somehow, something funny seems to happen on its way to the forum. The attrition of good legislation by social and economic pressure, for its perversion by administrative decisions reflecting personal prejudice, capriciousness, and political expedience makes it come out other than intended. By setting forth explicit instructions to which all parties in decisionmaking must address themselves might abate somewhat this deficiency. Perhaps the guides should do what they state they do not do: this is, they should establish a mandatory process for decisionmaking.

Let me now make specific references to the guide. It lists some 15 specific disease-producing agents. I wondered why these 15 were selected. They are not the most important and there is to some extent duplication. Either arsenic or lead might have served to illustrate heavy metals. Inclusion of beryllium is interesting, but not practical. For purposes of practical discussion, I would have selected hexavalent chromates rather than chromic acid. But, inclusion of the chlorinated

hydrocarbons and some of the substituted aromatics will present greater problems and are more important to decisionmaking.

The comments of the guide with regard to exposure and probability are unavailable where exposure is in excess of the standards, and there is clinical evidence of disease. The use of such terms as "unlikely," "possible," and "probable" are inadequate, and will never fully satisfy criteria for causal relationship in occupational disease. They are even less applicable to the problem of aggravation where exposure levels are minimal or inadequate and where there are contributing predispositions on the part of the claimant. The question of reasonable medical certainty must be addressed by a yes or no response if decisionmaking is to be facilitated.

The portion of the guide outlining medical history, though extensive, is somewhat incomplete. The addition of occupation as a component to history taking is a distinct plus, but, unfortunately, that portion of the history is likely to be glossed over by the treating physician. It is not enough to ask what is the patient or claimant complaining of, but is even more important to ask, why is he complaining. I can tell you from experience that it is of practical importance when presented with subjective complaint and inadequate objective evidence to support such complaint. One must by questioning seek to answer the question, does the complaint reflect personal or economic gain? Is it a reflection of interpersonal stress in the work place with management, supervision, or is it harassment with fellow employees? Does it reflect some domestic instability, and an attempt toward avoiding support or other moral or personal commitments?

I would wager that the diagnosis of most occupational diseases is made by default. Mind you, this has no bearing on the validity of a claim, but the diagnosis by the primary provider of care, who frequently couldn't care less, is made without adequate knowledge of disease, alternate diagnoses, knowledge of the workplace and of the nature and extent of exposure. The physician will reflect his patients and his own personal bias, expressing opinion which stems not from his head but from his heart; were I less well qualified and in general practice, I might do the same, and therefore I should not fault him.

Moving to chapter 2, I would not regard nonoccupational disease as a good choice.

In chapter 3 which deals with expert testimony, the statement is made that a competent medical person need not be a physician. I would take exception to that statement since I regard a competent medical person to be a medical physician, either an M.D. or O.D. Decisionmaking involves the health of the individual worker in whose behalf a claim for occupational disease has been made. Decisionmaking does not involve directly the health of the environment. Other scientific opinions may be solicited either to reinforce or to rebut the opinions of competent medical personnel.

The criteria for establishing competency of a physician or hygienist are excellent, if one can convince the administrators to use such criteria. I will heartily endorse the last portion of chapter 3 which deals with environmental exposure evaluations and speaks to the adequacy of representative sampling procedures both as to methods em-

ployed and equipment utilized. Further, one must be certain of the reliability of the analytical procedures. Laboratories performing these services must be familiar with procedures. None may question results stemming from laboratories which may perform analysis on an occasional basis. It is not uncommon for those of diligence in our sampling efforts to be frustrated by analytical reports which experience and eyeball toxicology tell us cannot be correct.

The most critical part of the entire project is chapter 4 dealing with matters of aggravation. It is the use of the phrase, "Adding any occupational contribution, however slight, may insure that the disease is compensable, which admits to the vagaries of administrative decision." Simply stating that it is a legal decision resulting from legislation and past court decisions, and not a concern of this guide, is a gratuitous comment and inappropriate. If it is not a concern of this guide, then what are we doing here today?

Aggravation must of necessity include not only those conditions known to exist before employment, but also those various impairments which appear subsequent to employment upon the basis of aging, attrition and intercurrent disease. The guide implies a lack of accepted medical definitions of aggravation. There may be no accepted definition, but I am sure there are acceptable definitions.

To regard emotional factors as aggravating agents is to open a Pandora's box, for here more than anywhere else in the entire spectrum of alleged occupational disease the important question of why becomes most important.

Under problems in aggravation a comment is made that the employer accepts his employee "as is," and discounting age, sex, heredity, and obesity as causative factors, "Only those environmental factors as exposure to toxic materials which may occur at work or in the nonwork environment are candidates for discussion of cause of aggravated disease or condition." Oh, no. One must not ignore all the dynamic impairments, diabetes, gout, hypertensive atherosclerotic disease, tuberculosis, alcoholism, psychiatric and personality disorders which to some extent constitute handicaps to general employment.

One must remember that the employee is a covered employee for one-third of the day, and that he may spend the remaining two-thirds of that day in pursuit of many devices and activities which compromise his health and preclude his reaching and enjoying normal healthy retirement.

The guide devotes considerable space to a consideration of coronary artery disease illnesses. Occupational myocardial infarcts which may be effort or work related. The former are straightforward occupational disease exposures, and knowing the characteristics of the disease and its physiological and pathological effects, one should have essentially no difficulty in establishing or denying causal relationship.

In the matter of myocardial infarcts of accidental origin, however, most histories are retrospective. The disease process is preexistent and in most instances the process itself approximated to the coronary occlusion probably began prior to the time of the alleged accident.

With regard to the selected solutions, I would concur in the need for an impartial advisory board. I do not believe the guide without the use of such a board could provide equitable assistance to the decision-making process.

The last proffered aid, that is to encourage preventive medicine through preplacement physical examination and job selection procedures, is a rendering of lip service to a philosophy that today seems to exist without meaningful official endorsement or sanction. There is a very serious need for the Federal Government to take a long look at the plethora of agencies, all of which seek to mandate and control the placement of the workers. OSHA, for example, states you must not expose, and yet stands at thwart of any attempt to seriously keep out of hazard employ those who may be at risk.

For example, the criteria document for T.D.I. states when personal history of allergic complaint, chronic obstructive lung disease, previous sensitization to T.D.I. is established, the applicant may be counseled on his increased risk, but you certainly can't keep him off the job.

The same may be said for other criteria documents as they relate to the obese, the alcoholic, those with coronary insufficiency, when it comes to matters of solvent exposure, heavy metal exposure, heat stress, or carbon monoxide. To permit any employee to remain in the hazard exposure after informing him of increased risk and accepting from such an employee a signed waiver nullifies the purpose of health surveillance, degrades preventive medicine, and beggars the financial and moral liability of the employer.

Reasonable concurrence with the same philosophy is also likely to get the employer into difficulty if he attempts to stay in compliance with the Federal Rehabilitation Act of 1973, and particularly its affirmative action provisions.

Administrative decisions which regard the economic costs to the employer as being of no concern and which do not regard significant risk to self as reason for denying placement, and further, which obstruct the employer's right to a preplacement examination or in the asking of pertinent questions which may lead to selective placement, are further illustrations of some Federal agencies speaking out of both sides of their mouths at the same time.

Further, the denial of appropriate examinations to the employer denies him the advantages which compliance with the knowledge provisions of the second injury laws of the several States would insure.

The remainder of the guide contains miscellaneous information of interest and concern to both practitioners and administrators. I suspect it is almost impossible to keep up with current NIOSH proposals and OSHA standards and that information presented in the guide may require updating.

I am less concerned with the numerical deficiencies in the guide and appendixes than I am with the philosophies expressed, and this you may have noted in my comments.

I would point out, for example, that the guide makes no mention of action levels, a concept of exposure surveillance which I do endorse.

The guide may be outdated when it indicates, for example, a TLV 0.5 mg/m^3 for inorganic arsenic.

In line with the recommendations of no detectable levels for all carcinogenic materials, be they arsenic, coke-oven emissions, or asbestos or vinyl chloride, OSHA now presents a standard goal of 0.004 mg/m^3 with an action level of a half that value for arsenic.

Under the coke-oven emission, for example, which I thought was an excellent section, I noted the statement: "The Standard Advisory Commission recommended a maximum level of 0.2 mg/m³ of benzo-alpha-pyrene." Actually, I believe that value was related to TWA particulates of which only 10 percent would be benzene soluble and of that amount only 10 percent will actually be benzo-alpha-pyrene.

Let me conclude by saying I think Dr. Osterritter has done a most credible job and when you face a constantly moving elusive target you can't score a hit every time. As I looked over his shoulder it may seem I was nitpicking, but really not.

I congratulate him and envy his patience and diligence. Thank you.

Dr. ROBERTS. Thank you. Before we start this period, the rest of the morning in which we will discuss these opinions, I would like to once again keep our discussion focused on what we should be talking about, and I will read through all the charges we have as our objective:

(1) Should impartial expert evaluation be utilized to assess the compensability of disease?

(2) What are the strengths and weaknesses of presumptions and guidelines?

(3) What information is needed for their establishment?

(4) For what specific diseases and groups of diseases are they feasible? and;

(5) What is the acceptable level of error in the use of these presumptions?

Now, we are open to reaction from the panel. I don't know whether Dr. Osterritter would like to make the first answer or would rather wait until the end. John?

Mr. LEWIS. As I listened to Dr. Osterritter I was very pleased that here at last was some assistance for those who deal with occupational disease cases on the trial level—on the claims level. Then when I listened to Dr. Amdur, I must say I despaired for the compensation system in general, because many of the comments made were applicable not only to occupational disease claims for the adjudication and determination of compensation claims in general.

And I must state that I have the feeling the indictment, as it were, of the compensation system was possibly too severe for the situation that actually exists. I think I am as aware as any in this room of the problems that we have throughout the country in compensation systems, in terms of obtaining the necessary honest, able individuals to administer compensation claims and to represent the parties involved, and to provide the requisite medical opinion and information.

Yet, I am convinced that there are still a few of us around who represent parties fairly, who decide cases on the basis of the evidence, and do not make up their mind prior to the trial of the case. And who attempt to have cases determined on the basis of the best evidence available, as opposed to political considerations and other questions of expediency. I would have no hesitancy to have a case in which I represented a party decided by Judge Novicoff or Howard Bunn. I would feel certain the outcome would be the best possible decision under the circumstances.

But we are faced—and when I say we, I am talking about both judges, attorneys, whoever may be involved—we are faced in occupational disease cases in particular with a lack of accessibility to information that is necessary to make an intelligent decision. For that

reason I feel Dr. Osterritter's project is invaluable in terms of the contribution it can make to the adjudication of compensation cases.

There is nothing worse than putting the factfinder, the adjudicator, into a position of having to decide the compensability of a particular disease process or condition and not give him the best possible medical evidence that is available. And, unfortunately, the use of expert panels is inappropriate in many areas of the country, as well as many kinds of disease claims.

In addition, we find that there is a great degree of disparity of opinion among doctors as to the work connection in many processes and conditions. Heart disease is probably the one we see most often on the trial level, and there is nothing more frustrating than to ask a doctor, "Well, doctor, the law says if in fact the infarct was the result of unusual exertion on the job it is compensable. Here is the exertion. Is there a causal connection?" And the doctor says, "I don't know. I can't answer that." Or the doctor says, "I don't feel under any circumstances physical exertion causes an infarct."

On the other hand, you have a body of medical opinion to the contrary. And you wind up fighting over factors and unknowns that really are not subject to being decided by a particular judge.

The judge has not gone to medical school. He can only deal with the case on the basis of the information that's before him. And unless we get him the best medical information available, we might as well forget about trying to adjudicate these cases.

I cannot analyze Dr. Osterritter's paper in terms of the accuracy of his guidelines or the mechanisms he proposes, but I feel that unless such guidelines and proposals are developed, and laws are changed where necessary to make use of these guidelines, these particular methodology, we are not going to be able to adequately deal with the possible flood of occupational disease claims and related claims.

So, I would commend Dr. Osterritter for his work and hope whatever disputes arise within his particular contract as to whether or not the findings are proper—whether or not the right diseases were covered, things of that nature—I hope these can be resolved instead of just ignoring the study, that it be expanded on, or reviewed, and developed and used to the great extent possible by the administrators, judges, doctors, lawyers, who are interested in having fair and equitable decisions made.

If I might take 2 more minutes I think I can tie this in with comments made before about fears or acceptances of the adversary process.

I have—though I am an attorney, and I have tried cases on the trial level in Florida and on occasion in other jurisdictions—I have no desire to make more use of the adjudicatory process than is absolutely necessary. Every case we can eliminate from the adjudicatory process is a plus for the compensation system.

These guidelines, if accepted, will help employers and claimants and their representatives to make some kind of baseline decision as to whether there is a reasonable chance the case can be held compensable. And if the guidelines are accurate enough and persuasive enough, we can avoid litigation through their use, and settle claims, and provide benefits or not, in a more appropriate manner than we do now.

When we get into a situation where we have plant doctors, the company doctor on one hand who is very conservative in some cases, and on the other hand we are forced to bring in claimants' doctors, either

those regularly employed by unions or on a case-by-case basis, we are bringing about the seeds of litigation. We are insuring in every case we are going to have double costs because we are going to have to pay for two sets of doctors and two sets of testimony, plus the adjudicatory process.

I think that it is destructive to the compensation system to make it possible even to get to these extremes. I find it amazing in the cases in which I sit that companies still in some cases—and I don't mean to indict the entire system but in some cases—use doctors who are so conservative that their—and perhaps dishonest—that their opinions and attitudes invite and in fact demand the need for contrary medical testimony from the other side. All it does is result in bad decisions.

I feel in this area, as I do in some instances in the malpractice area, that the medical profession has the responsibility to get rid of those doctors who are not intellectually honest in their dealing with industrial disease, industrial accidents, and injuries.

If it is true that there are doctors who will treat according to what the employer wants, as we heard yesterday, I can't imagine how a medical society or board of examiners in a State can permit that kind of doctor to continue to operate. Just as attorneys who run cases and obtain perjured testimony ought not to be permitted to continue to operate within the system.

But, this requires more responsibility than most professional organizations have so far been willing to undertake.

Unless we get rid of these people, we simply are not going to have a good situation.

I am convinced from my own practice over the years that it is not that difficult to use, obtain, hire, or retain doctors who are acceptable to all sides, and when you do that you cut down on the necessity for adjudication in an enormous number of cases. And unless the people here and the cohorts back home are willing to do that, the system isn't going to work, particularly in occupational disease cases.

But, if we use things such as Dr. Osterritter's guidelines suggest, if we do something about the participants in the system who don't belong, cut down on the adjudication, and deal with the program as it needs to be dealt with.

Dr. ROBERTS. Thank you.

[Whereupon a coffee break was taken.]

Dr. ROBERTS. John Lewis would like to add a statement to the last statement and Dr. Mancuso and Dr. Amdur also have asked to be able to make some comments.

Mr. LEWIS. I hope to avoid extended debate over things I did not intend to either say or imply. First of all, there is no question that it is not only company use of inappropriate physicians that brings medical conflict in compensation cases.

We have the same problem with employee representatives bringing in appropriate physicians with what I consider intellectually dishonest opinions into the system, which encourages the use of rebuttal-type medical evidence on the part of the employer.

Secondly, I did not intend to indicate that a conservative doctor or a liberal doctor is either dishonest or inappropriate in the system. What I refer to are those, again, that I consider intellectually dishonest and do not attempt to give their best opinion.

Everyone has their particular learnings in terms of disability ratings, what they are willing to say because of intellectual feelings; but there is a class of physicians that on the left and right we refer to quite appropriately as "whores," which are well known to anybody that practices on the trial level, and to those doctors I refer.

In addition, when we talk about, when I talk about obtaining or getting other medical testimony, I am not referring to obtaining physicians through political purpose or favors or things of that nature. What I was referring to was the fact I know those of us that deal with cases constantly in the particular area, know which doctors are intellectually honest and good judges and deputies, whatever the terminology may be in the jurisdiction, know who they can rely on.

I have found in the years I have practiced, whether I am representing a claimant or an employer, it makes no sense to go in front of a judge with one of these type doctors. In the years I have practiced I have never, never brought in a doctor for the simple purpose of rating. The only time I asked for that was when I thought an individual was not getting proper care.

A good judge already knows which doctors are good, which doctors are competent, which are conservative and which are liberal, and in his decisions can adjust.

And that brings me to the final point I did not want to deemphasize the importance of good attorneys. Good factfinders. A factfinder cannot operate properly without the best of medical assistance and having the best of medical assistance available is of no use whatever unless we have good adjudicators. Good factfinders who make intelligent decisions that are capable of taking into consideration the facts Dr. Amdur talked about.

He can ask the questions: Is the claimant honest? Is the disability being alleged really the result of an employment related factor? Is there a legitimate claim? And a good factfinder and experienced judge has the ability, and I am convinced does, in making his decision, take into consideration all these factors.

Appointments to these positions are political, and there are young and inexperienced judges and part-time people, and I don't intend to set out part-time judges entirely, but they bring into the system potential problems in terms of getting intellectually honest decisions.

The responsibility is not just doctors, but there is an equal responsibility on the part of the doctor as well as the adjudicators themselves.

Dr. ROBERTS. Thank you. Tom?

Dr. MANCUSO. I have a very few brief comments relative to the presentation that has been made. I will not review the document line by line. Of course, I realize the source from which much of the data, actually much of the data, technical data is commonly available.

I saw no new contribution on the technical side. In fact, some technical interpretation is in variance with existing numbers. The main point is the guide concept of developing a decision is predicated upon the availability of, the accuracy of, the completeness of, the necessary information upon which a decision can be reached.

In essence, the fact I believe attorney Lewis and all others may be seeing in this guide, an availability of facts, are there. I am saying the focus should be on the necessary data—basically, in decisionmaking

in workers' compensation cases, what the guide presented assumed the facts existent at each workplace, were:

(1) The entire comprehensive listing of toxic substances or chemicals and metals with all trade name products used and chemical substances and technological data, are clinically identified—the number of times used in each department—so proof has been recorded and available.

(2) It assumes comprehensive records of all environmental testing and control measures—when installed, when, where, and how completed.

It assumes the system is providing toxicological data to doctors.

It assumes the availability to the system of complete medical records of medical examinations and other reports on each employee during his employment.

It assumes the existence and identification and availability of all work-stimulated exposure, the risk, how they refer to epidemiology in reference to the interpretation of the diagnosis. And in decisionmaking, you can't do it epidemiologically, you can't come to a decision unless you have these basic facts.

I believe what is required is such critical data be developed and be available for decisionmaking.

Dr. AMDUR. I just want to make two comments. No. 1, I am glad Mr. Lewis made his subsequent additions. I think he and I agree, intellectual integrity is not limited to the legal professional any more than the medical.

I want to make it clear, I do approve of the guide. I am honing my remarks—they may have been missed by some people. I do approve of the guide. I think it important, and important because if they will adhere to it, they will provide for not only claimants, but also for all other interested parties, a recognition for review if the guidelines are not followed. So that, I do approve of this, and I think that should be mandatory.

Dr. ROBERTS. Mark Solomons.

Mr. SOLOMONS. I think that Dr. Osterritter and Mr. Lewis have opened up a new discussion for us.

Thus far in the conference the scientists have attempted to bring the massive problem of occupational disease into a logical perspective.

My colleagues in the legal profession—with the possible assistance of Mr. Lewis—have responded generally with reference to political, economic, and social considerations. And, I have asked the question whether given these considerations a realistic possibility exists to confront these problems in a way meaningful to the worker and at the same time acceptable to those paying the bill.

While these considerations must be addressed, I think Dr. Osterritter's statement opened up a new area for discussion. It may be this area Drs. Discher and Selikoff attempted to open up earlier this morning.

Perhaps a fair statement of the questions raised by Drs. Osterritter and Amdur and Mr. Lewis is: How is it possible to translate the work of the scientist into a product that can be utilized in the present workers' compensation system, so that benefits can be provided to those that need and deserve those benefits?

Ms. Snyder and I have in our paper on the black lung program attempted to explore the feasibility of making such a translation.

The issue agenda prepared by the task force indicates that the question of presumptions and medical boards properly fall within the area of discussion today.

I would like to address myself to the question of presumptions. I think Mr. McMahan properly characterized presumptions yesterday as a method for shifting the burden of proof.

The presumption is a great deal more. It is a method for effecting translation of scientific data into the law. In my experience I have dealt with three—I can't call them presumptions—three different ways of effecting this translation:

First, the subject of epidemiological presumptions. Second, perhaps could be called nonspecific presumptions, and the third and fourth don't contemplate presumption in the legal sense of the word at all, but could be characterized as medical boards.

Addressing myself specifically to each of these four types of ways of translating the scientific data into the law: First epidemiological exposure, which is the kind you experienced in the black lung laws, which is the kind where a legislative body is able to take evidence, epidemiological evidence, from a great many sources and resolve whatever differences in that evidence may exist. The specific presumptions of the sort we have in black lung law do not take into consideration questions of individual susceptibilities and multiple-factor interactions, although it may, I am sure it is possible to do that. It is difficult to do that if you are using terms such as number of years of employment or exposure.

Now, general presumptions, such as the language that appears in the Longshoremen's and Harbor Workers' Compensation Act, and the language cited in that act is fairly cryptic. It is: "a claim is presumed to fall within the provisions of the act."

Federal courts and certain U.S. courts of appeals—one in particular deciding a case last week—have concluded that the meaning of this presumption, if an individual can raise a reasonable inference of causal relationship—and in this particular case the question involved a back injury that occurred perhaps a year before the claim was filed, but did not manifest itself until somewhere on down the line. The absence of showing some intervening factor could not be considered a cause of the resultant disability. The court said that the presumption which is contained in the Longshoremen's and Harbor Workers' Compensation Act, which I think is properly called general and nonspecific, would be sufficient to establish a causal relationship.

Now, the third and fourth go together to this kind of a problem, which will be medical boards, and this will be a departure because, at least in the case of medical boards so far as our experience is concerned in the Department of Labor, a new approach to this kind of problem.

I think the medical board concept is a possibility.

Instead of presumptions, or perhaps in conjunction with presumptions, the use of definitions, I think, is another way the claims determination process could be designed rather than utilization of presumptions.

I think one way in which the epidemiological data could be threaded into the law would be through the enactment by the legislature of a definition of a particular condition, relating that condition to employment by use of information before the legislature and by defining that particular condition in sufficient enough detail so that the adjudicator with whom the ultimate decision would, of course, lie, is able to examine fairly specific and fairly subjective evidence and make a determination in a reasonably easy way, without the adversary process as to whether an individual could be considered to fall within the four corners of the compensation law.

MR. JOHNSON. Let me take a shot at the question you raised.

Possibly this is an oversimplification and my experience with the process has only been in one State, and not to any great degree. But, based upon what I observed it would seem presumptions can bring reasonable certainty into the law. That is good. That is exactly what the workers' compensation law is intended to be. However, they also tend, as a practical matter, to establish an irrefutable position, and when you couple that with the liberal construction of the law that is mandated in many States, it almost, the presumption in itself almost becomes a mandate.

Those are the extremes of the pluses and minuses as I see them on the presumptions.

You also asked another question: Should impartial expert medical evaluation be utilized. I think that was the way you phrased it. And here, in my opinion, the answer is one clear unequivocal, "Yes." There is no individual better qualified to make a decision on the causal relationship than those who are schooled in medical sciences to handle cases involving disputes.

We just cannot turn to the adversary system to solve all our problems. In fact, the adversary system has overburdened some of our problems in quite a few States now.

DR. ROBERTS. Tony?

MR. MAZZOCCHI. I have one or two comments. Some of my comments do fall under my comments for tomorrow, so I will reserve those.

I would just like to mention the fact that 75 percent of the work force is not covered by these figures. There is a whole large body of workers who have no access to resources. They may appear before a workers' compensation board with a docket that that individual recruits. That normally takes place in those compensation cases of a physical character.

On occupational disease—again I want to mention the fact when I say those areas coming into the system, I mean that 3 percent that we operate. It is very little and can be characterized by "none." So, the idea is to get the cases into the system, and you get cases into the system by identifying the problem in the first place.

Let me talk about the comment about "unbiased." There are no unbiased people. I take my biases with me wherever I go. I have never met during the course of collective bargaining, during the course of work in conjunction with the scientific community, I have never met an unbiased person. There is no such thing, and I have no quarrel with that.

A scientific person who represents a company, let him speak to those biases. I know those biases and I have to attempt to convince someone

else my biases are valid, and I will call upon those people who I think will support the biases I have on behalf of the worker I am representing. That is the way life works.

And I think one would be absolutely naive to think that a workers' organization would say so-and-so is an unbiased academician, or doctor, and he is a well of wisdom, and will make a judgment in this case without being affected by all sorts of other sources. It ain't so. It doesn't work that way.

And, as I say, I still preferred—I have no conflict with conflict situations because in conflict there is resolution, things get done. That is the only reason we are here.

People cry about the situation and make certain demands that these demands haven't been fully met, and won't be fully met because they haven't raised the issue.

Again I would like to point out that conceptually the need for information is important. I just have a quarrel over who gets the information. The assumptions that Dr. Mancuso spoke to I agree. The information is not at the workplace. None of the assumptions that exist is in this manual exist out there in the real world. If you find some they fall into such a minute percentage that have proper records and proper medical capabilities and have proper monitoring. That is a world, again, that doesn't exist.

In order to have a catalyst that gets cases identified and into the system where people can draw upon proper resources, only come about as a result of recognition. The idea of generating information and that information can be posted in the workplace as mandate requires. Then will allow workers who need resources and need to be able to identify what is the effect, then will allow them to reach out and draw upon people to support their particular case.

Management has no problem of drawing on resources. They know where they are. They belong to all the organizations that Dr. Howe spoke about. They are in our organization, their organization, organizations in the community. We certainly don't look for them to provide us with the types of information we need, we know we have to get that information through our own devices. Those devices will develop and advance as recognition develops.

So, the idea of a guide is important. And I am not going to detail my objections to this particular guide. A guide is important, but its relevance is what I want to concentrate on.

Who gets what? And I say no system is going to work unless the victim is at least made partially an equal in this whole dilemma, and the first step in making him an equal is to provide him with the type of information that can be developed, that can act as a catalyst of getting cases into the system.

Dr. ROBERTS. Nancy?

Ms. SNYDER. As an administrator, for the record, I have a strong uneasiness about this guide. There is the old saying, "You live by the sword and die by the sword." There is a tendency for many people to see this as a panacea, and they grab it as they go toward decision-making on occasion.

I would suggest to Dr. Osterritter and NIOSH that they reformat this. That the decisionmaking process, perhaps be first, and then the

technical information be in some kind of looseleaf attachment that can be constantly updated, and constantly made relevant and made current.

And that is what the Federal Government doesn't need to do—that is to finance one more Bible. Unfortunately, this would become that, and I would have a hard time right now suggesting that the plethora of decisionmakers who are involved in decisionmaking in the black lung program could use such in its present form.

Dr. ROBERTS. John and then Phil.

Dr. OSTERRITTER. I am certain it will not help in the black lung—

Ms. SNYDER. No, no, no. There are possibilities, and those same judges are deciding—

Dr. OSTERRITTER. That law is unto itself.

Ms. SNYDER. I don't believe that.

Dr. OSTERRITTER. I am not concerned about biases. We wouldn't have a system if we didn't have biases. You are on one side and I am on the other and there are biases. I am concerned about liars, and we know a lot of them.

Paragraph two, I think a guide such as this would encourage management to get more industrial hygiene information when they find when they go to arbitration or board hearings it will be asked for by the other side.

Also I have found in, particularly the New York-New Jersey area, where employees are more and more calling for State registers to accommodate the data which only in the past the employer could have.

Dr. ROBERTS. Phil?

Dr. ENTERLINE. I was very happy that Mr. Solomons clarified presumptions for me. I think I understand what they are now.

I wanted to say something about the epidemiological presumption. As he pointed out, they do accord the ability, and Dr. Selikoff talked about that a lot yesterday, and he pointed out most people don't get the diseases from what they are exposed to.

And my third point is if you use that epidemiological data for presumptions, we must be willing to be wrong much of the time. And furthermore, the extent to which we are wrong, we probably would know about.

For example, if we were adjudicating a black lung case and had a man who had no X-ray evidence of pneumoconiosis, and he has breathing difficulty, we must be prepared to be wrong most of the time—9 times out of 10.

So, what I am saying, epidemiological evidence is such we could assign probabilities to being right or wrong in some cases, if we had a fixed set of rules so far as working conditions, with some kind of prevailing circumstances that it could or could not be due to the work place. These probabilities could be known, and the only point is, we must be prepared to be wrong a lot of times. In fact, I think Nick Ashford did discuss the kind of evidence we need to set standards, it is a different kind of evidence than an individual case, and I think the difference is the probability of being right or wrong.

Dr. ROBERTS. Shelly and then Dave.

Mr. SAMUELS. I think that Ms. Snyder made a very important point. The document as an information system has validity only in—

so far as it is part of a broader decisionmaking process. The document is a distillation of the moment, which is no further advanced than the kind of thing they had in the Middle Ages when they wrote things out and passed them on hand by hand. It is incredible to me that information like this which is important to any decision-making process, that it would have to come in the form of any kind of guide. Even some kind of a replaceable looseleaf guide.

The fact is we have the capability to develop an information system that could be made available to any lawyer, court, worker's compensation panel, or what. And that would be an absolute minimum to reduce the difficulty of error.

For example, I showed Dr. Discher the little sentence on inorganic arsenic and cancer—and I don't want to speak for you, Dr. Discher—but I presume there is some question about the way in which that was phrased. And given the assumption of causality which Mr. Solomons quite rightly says we have to deal with anyway, in terms of the individual worker, the outcome could be disaster.

Dr. DISCHER. I would like to comment on Phil's reference to the magnitude of error.

It would seem to me if a really large error is going to be made, probably the use of presumptions is going to go by the wayside. I am not a lawyer, but I suspect we will be pinned down to only using epidemiological presumptions when a relatively small error is made. I don't know what society will expect.

I think we are going to have to take the false positives and false negatives and total them up and come up with a relatively small number, whatever the diagnostic criteria is going to be—in epidemiological studies, and I would like to disagree with you with respect to what at least I as one member of society would be willing to put up with on presumptions based on what little I know about it.

The other comment I would like to make is just because you have some standard diagnostic criteria, that you jump into the area of presumptions. I didn't mean to convey that.

I meant to insinuate, that the area you called your third and fourth areas, using medical review panels that could declare in given instances a set of presumptions, rather than to establish it as a matter of law for many cases.

Dr. ROBERTS. Mr. McMahan.

Mr. McMAHAN. I don't wish my silence to be construed as agreeing with some of what Mark said about presumptions. I will postpone an expression of my views at length until tomorrow.

I would only say I believe the kinds of presumptions he was talking about are indistinguishable from definition and have a very limited legitimate use in the legislative process generally, and especially in the area of workers' compensation. I will leave it with that for the time being.

Dr. ROBERTS. Andy.

Mr. KALMYKOW. I would like to comment—Dr. Discher indicated that these presumptions probably, if they didn't have support from the evidence, would fall of their own weight. I don't know Mr. Solomons was advocating the broadening of the type of presumptions that we have in the Coal Mine Act to other industries, but, as I understand it and there was a wealth of medical information that we have

here today, and I would be very glad to be corrected, but it has always been my understanding the incidence of coal miners' pneumoconiosis was something in approximately 9 percent with respect to active coal miners. That is simple pneumoconiosis. And complicated pneumoconiosis of approximately 3 percent, and yet we have had coal miners in—the current number of coal miners is approximately 125,000 active underground coal miners, and I thought we were going to discuss that tomorrow, but I think we might mention today—that there are, there were in 1939 some 400,000 coal miners. Yet, the findings under the Social Security Administration have amounted to over 500,000, some 540,000, and there have been some additional 80,000 under the claims, and the presumptions have operated to make almost all of this compensable, and there is legislation pending that would make the rest of them compensable. So that I think that would be the result.

I don't say that is not a proper thing to do. I am just indicating what the effect of it is, and that the correction doesn't automatically take place, but possibly becomes aggravated.

Dr. ROBERTS. Irv?

Dr. SELIKOFF. I think Mr. Kalmykow has been correct in the statistics he has quoted. However, these statistics can be manipulated—not that he manipulated them—but they can be.

I don't know if it is 9 percent from 5-year miners, 10-year miners, 20-year miners, 30-year miners, or 45-year miners. The incidence varies very greatly with the duration of the onset of work and total amount of work, and I would much rather you specify the miners of whom you speak before we readily accept any figures as generalities.

Second, it is undoubtedly true there were 400,000 miners 40 years ago, but many joined the work force after that and are now in the compensation pool. And there were also many miners in 1935 who had already retired, but not among the 400,000, who are also now in the compensation picture.

So, there again, numbers can be very tricky and we must be very specific about whom we speak.

Dr. ROBERTS. Howard?

Mr. BUNN. I have an observation that has been kind of bugging me ever since we got into this whole area of medical determination of causality. I would like to refocus it for you because it is going to be one of the ultimate decisions the task force policy staff is going to have to wrestle with. And we have been gravitating into this area, we have been gradually, and I have an idea we will be getting into it in more detail tomorrow as we get into the black lung program.

That is this, it appears to be surfacing—at least this is my perception, perhaps I am wrong—that the traditional approach that has been used in most State compensation boards and possibly to some extent in Federal programs, works well once the case gets into the system. I have no quarrel with what Mr. Kalmykow said, that the laws have been greatly improved in workers' compensation in the States.

But, it seems to me that the flaw in the system as I perceive it, and I think the way it is, is it depends on your point of view or biases or whatever, but it seems to me a considerable percentage of the occupational disease cases under the traditional approach we have been using to this point may not be getting into the system due to the traditional approach.

The black lung approach, which we will get into tomorrow, was an approach to try and overcome the complexity of the traditional medical causation determination.

All I bring out to this group is it seems to me due to all the accent on the occupational disease problem today, and due to the fact I tend to think that it is not going to go away, that there are going to have to be some innovative approaches used, whether by other types of presumptions or whether a blend of the various approaches that Mr. Solomons so well outlined, it seems to me that there is going to have to be a better way than just the traditional way that we have used to this point.

And as we continue to think, I would like to see if there is any development of any real consensus or ideas among the panel as to which was the best way or is it still a matter that we can't reach a consensus on, because I think the slippage, if there is a slippage, and I think it is apparent there is, some mechanism is going to evolve or emerge to try and take up as much of it as you can, and try not to fall into the caveat. Mr. Kalmykow just mentioned, and that is to pick up cases which are not work related, and of course, trying to reach that happy medium is very difficult.

It seems to me the traditional medical approach we used to this point is probably due to the emergence of long latency periods of diseases, that it is just not getting all the cases that should be gotten into the system into the system.

I am not trying to suggest what I think the answer is because obviously this is a problem the task force policy group is going to have to wrestle with, but I would like for you to give some more consideration to this as to this area in which cases are just not getting into the system due to many problems.

Dr. ROBERTS. Next we will go to Peter Barth.

Dr. BARTH. Do we have a document that will work or at least we can make changes in and it will work—at least advance our knowledge somewhat? And I think we talked a lot about it. But, we haven't specified what type of things need to be done to make it more usable or a more workable document.

I would like to throw a few ideas down and at least talk about this particular issue.

I think it is pretty clear if you look at that, much of the criteria from which we diagnose occupational disease is the type of exposure and, you know, whether or not a disease manifests itself. Now, this is a presumption. I think primarily the use is based on the presumptive approach.

Certainly I think that one thing we need to try and find out, or consider if we can actually adopt some epidemiological information, and that is whenever you have a presumption, you are going to include a certain number of false positives. It may be a lot or it may be a few. I don't know. But, it may make it somewhat easier to decide to what extent you view a document of this nature.

I was a little bit concerned because we talked about sufficiency of exposure. I didn't find anything about the length of exposure as well as intensity. I was wondering if this is not the type of information that could also be added to a document of this nature—being a very non-medical person.

Third, Dr. Amdur made a statement nobody challenged and I wonder if someone might. That is, for the purposes of these determinations that only a trained physician would be regarded a competent medical person, and I presume not including toxicologists or industrial hygienists, for the purposes of giving testimony. I would rather doubt that all the nonmedical personnel here would accept that, but I haven't heard anyone challenge it yet.

Dr. ROBERTS. Any other comments or questions from the panel? Shelly?

Mr. SAMUELS. I think what you say has to be taken into context with what Ms. Snyder rightfully brings to our attention—you know, what is the decisionmaking process.

I am disturbed by medical decisions being made by people who don't understand medicine or biology and then it seems to me in the decision-making process a bifurcation has to be made between the determination of the relationship of the condition to an exposure, and then what do you do after that.

In other words, the judge, if I understand what happens in these workers' compensation proceedings, he is doing both jobs. He is listening to both sides. He is absorbing medical information and is making a judgment which might be right or might be wrong, and perhaps one of the solutions is to develop a decisionmaking process in which the role of the decisionmaker is very carefully defined, so that instead of an administrator making medical decisions, you have an administrator making administrative decisions.

Dr. ROBERTS. Does anybody else want to comment?

Dr. HALPERN. Do you consider this guide to be truly as titled, a guide for decisionmaking?

Mr. SAMUELS. The guide that has been presented?

Dr. HALPERN. Yes.

Mr. SAMUELS. Absolutely not. For example, what Tony says is absolutely correct about biases that exist, and the least an information system would do, and we have the technological capability to build an information system to do that, is to indicate the range of opinion.

Dr. HALPERN. There is some danger in doing something like this when incomplete, when we have experience in situations like this that we have. For example, under situations where people have little or no information they can draw upon, they develop, or tend to develop tests, and you wind up with a certain amount of tyranny. The tyranny of testing is a well-known problem. People develop testology. They develop things that are guides for decisionmaking. And what happens very frequently is because people have human frailty they don't use the techniques such as guides for decisionmaking. Rather, they use the techniques as a decision themselves. You take the individual out of the process, and this approach, although very useful, is very dangerous.

Mr. SAMUELS. I agree this document is not a decisionmaking process. The document at best is a distillation of the moment. It could be used in the decisionmaking process.

And I am not satisfied with distillation at the moment. I am suggesting we learn something, and there are new information systems that could be utilized, that in fact would reflect a range of opinion.

Second, what I am saying is you have to look very hard at the whole process of how a decision is made and carefully define roles. There is

an attempt in the literature to do this. It is the National Academy of Science report on the regulation of chemicals in the environment.

And I am not saying I am satisfied with this, but it is interesting that the agency that commissioned it, the Environmental Protection Agency, very carefully, after they looked at what this group developed, disavowed about half of the recommendations, and passed it on to another NAS panel which will look at it on a broader scale to the tune of some \$5 million.

There are difficulties in developing a decisionmaking process, but I think it has to be faced, and it is equally as urgent to do that as it is to carefully define the medical side or even the legal side of the workers' compensation picture.

Dr. HALPERN. I would still like to emphasize the dangers of this kind of thing. Again from my experience and I am sure other people share it, definitions and guides to aid decisionmaking, turn out to be very frequently other than guides.

Mr. SAMUELS. I couldn't agree more. For example, I fail to understand why it is necessary to even define something called occupational disease.

Dr. ROBERTS. IRV?

Dr. SELIKOFF. With regard to the wisdom of the moment, I would like to confess an error that might illustrate this. I was chairman of a conference in 1972, an international scientific meeting on coal miners' pneumoconiosis, and it was only after the scientific information began to come in that we realized we had defined the wrong conference. The name should have been "Respiratory Diseases Among Coal Miners." The pneumoconiosis part, the fibrosis, and the dust² in the lungs, was only in part, and in some instances only a small part, of the responsibility for the disability of the men, and that the other diseases, the bronchial diseases, the emphysematous diseases, were much more responsible for the difficulty.

And it was only at the last minute, not in time to change the name of the monograph that resulted from the conference, a 900-page monograph, that the wisdom of the moment was shown to be inadequate.

Dr. ROBERTS. George, do you have a comment?

Mr. BECKER. George Becker, the Steelworkers' Union.

I tend to relate to specific examples, whereas the majority of what I have listened to in this room yesterday and today is more theoretical in approach to me. And this presumption is something I am in agreement with very much.

And I would like to point out for you the problems I have experienced in our union, in lead, for example, and consider this in the approach of the presumptions in the responsibility of being able to relate a direct cause.

It is fairly well known that excessive body burdens of lead cause kidney damage, or can cause kidney damage. Yet, doctors tell me routine medical analysis will not disclose damage until approximately some 90 percent of the kidney is affected. This is on routine medical examination. Yet, at that particular time, when some 90 percent of the kidney is affected, it is impossible to go back and tell what caused this.

So, as a result, we have been very unsuccessful in bringing any workers' compensation for diseases in plants for kidney damage.

Very unsuccessful. Yet, I can show you a plant of about 50 people where 5 of them are disabled because of kidney damage.

Now, I think anyone that knows the ratio for kidney damage in the general population would agree that 5 out of 50 is an excess amount. At least that is what I am told by competent people. Now, if we don't have the presumptions to rely upon, what is going to protect these particular workers?

Another aspect I would like to lay out is I think there should be some consideration for a requirement that a company make available or maintain throughout the life of that worker the medical examination, any medical examination they conducted on an employee. I think they should not have the right to selectively release information on the medical condition of this employee. You know, that they can pick only particular points and present this only. I think the entire record should have to be made available then, if we are ever going to finally make the decision whether this is work related, et cetera. I think this should be available to the employee and/or his representative.

To illustrate again some of the things I ran across, were where X-rays the company has had and we didn't know, the union representative didn't know at the time that they had accumulated over the year, which showed a progressive increase in lung damage from silicosis. And I am talking about sandblasters working at cleaning out railroad cars. The company had this information, and it would show to competent people who can analyze this an increase starting back maybe 15, 20 years ago.

We did not have access to this. Although we knew it was in the particular files and in this particular instance we got it. I am saying ordinarily we would not have access to this.

Once the union got involved in cases of fractures, we found out the company had X-rays that would show hairline fractures, and none of this was ever explained to the employee. In fact, we find many times companies tend to negotiate with the employees on settlement without involving attorneys, without involving a comp board, trying to make a settlement with the employee in the shop, and again relating back to the fact some 70 percent of the workers not covered by labor agreements, these people are at a distinct disadvantage.

I can show you a foundry in the State of Iowa, a steel foundry, where we do not have the right to have a union attorney per se represent these people in mass. Their settlement in that particular foundry is about one-fifth of the total settlements we have in the State of Illinois in a similar-type foundry where we have the union go in and represent these people. So I think the recordkeeping aspect is something that should be looked at, and when you think about the statement that 100,000 people are dying yearly from occupational disease and another 400,000 are being affected, surely these people are not receiving the settlements they are entitled to or coverage they are entitled to.

Dr. ROBERTS. Thank you. For the moment, Mr. McMahan, I will stick with the audience, particularly the members of the Task Force staff. Do any of you have a reaction to anything that has taken place yesterday or today that you would like to discuss or ask a question about or comment upon? [Pause.] If not, Mr. McMahan.

Mr. McMahan. I would like to respond to that specific example by asking, if it is impossible to tell in your example whether a specific case of kidney damage—medically impossible—to tell it resulted from lead exposure, and you insist on presumptions which would conclude it did result from lead exposure, then all you are doing is redefining kidney disease among a certain group of workers into resulting from lead exposure. Now, that is purely fictional.

It may be a legitimate device for bringing all cases of kidney damage in certain groups within the present compensation system. I think that is not a wise approach to solving these problems and providing compensation for people with diseases whose causation is unknown.

Why not simply pass a law saying all workers with kidney damage in a certain industry will be compensated.

Why indulge the fiction it is caused by something which is medically impossible to determine. I think we deal with these presumptions because we want to devise artificially fixed liabilities some place, and in the process it serves no medical purpose. It doesn't serve the purpose of fostering prevention, and it simply, it fixes liability, and I think if we deal with these things realistically we might begin to look for different solutions once we realize the end we wish to achieve.

Dr. ROBERTS. Doctor Berkowitz?

Dr. BERKOWITZ. In the issue McMahan raised, there are two balls kind of up in the air. From time to time they get thrown up and I never get the feeling anybody caught them.

One has to do with the issue raised by Dr. Selikoff and others about medical surveillance. It is pertinent, I think, to the issue of kidney damage and other issues we have raised. We have raised that issue and dealt with it only partly.

It seems to me you want medical surveillance for purposes of compensation, yes. But, that, in fact, may be the most easy thing to resolve.

You want it for purposes of placement, intelligent placement of people. And Dr. Amdur brought up sections 503 and 504 of the Rehabilitation Act, which is maybe just something that is going to complicate our lives whether we like it or not, because that prohibits discrimination on the basis of handicap and requires companies to have affirmative action plans to hire these people. And, obviously, this has to be reconciled somehow with what we have been talking about today. And, thirdly, you want it for purposes of health maintenance.

Now Tony and others have brought up a kind of separate ball in the air, the workers want to know, right to know information. It has been brought up about five times now that the workers need to have medical reports.

If when you begin to talk about information like this, as an economist my heart warms toward that because it is information that presumably will allow three types of exchanges in markets to operate. I am wondering whether or not there is a sentiment here for solving a portion of the medical surveillance problem, by saying to a worker, OK, we tell you these things, we bring this about, we identify substances that are used, by trade names, by generic names, et cetera, and now that you know this, you have the responsibility for being periodically examined, and thereby, at least, meeting some of the needs of medical surveillance.

I am not saying for the moment whether it is possible to devise a method for paying for this—leaving that aside for the moment—is it a feasible idea to say we can't, as the Government, or as a workers' compensation area, or even a corporation, that we can't devise all the complicated followup that is necessary. We instead provide you with particular information; we provide you possibly with centers you can go to for this kind of thing; but it is your responsibility over the years to be examined, to keep particular records, so when the time comes when there is a compensation decision to be made, you will have this available.

Dr. ROBERTS. Before responding to that—Phil, I know you had your hand up—but I think it might be worthwhile to see if there is any reaction from what Dr. Berkowitz said from anyone on the panel before we switch topics. Nick?

Dr. ASHFORD. What is really causing a lot of problems here is that we have a fairly massive disease problem in the country, whether occupational, environmental, or traditional, and we haven't adequately dealt with the disease problem in this country. We have inadequate delivery of health care to many people in lower social economic groups. We don't have adequate unemployment insurance for people on the job; we don't have hiring and firing practices in terms of work; and we have some diseases which are definitely occupational in nature and we can identify with confidence.

The resistance we see, I submit, for identifying diseases as occupational, is the floodgate fear that we will sweep all these terrible medical problems into the workers' compensation system. That is the thing underlying a lot of this.

Information is critical. Tony put his finger on it and you alluded to it, and I have some background in economics, and I underscore the importance of information, but my heart doesn't warm very much to the—of health to a bargainable item in the marketplace.

The fact that the worker should have control as to who it is who diagnoses his medical case, is important, but it is also important who pays for it. You didn't make clear, at least to me, whether he pays for it, or society pays for it, or management pays for it, or the consumer pays for it through increased prices. But those are the fundamental issues.

I am a pessimist in this area. I think the separate function of the health care system, or unemployment insurance, or social security, and workers' compensation—this fragmentation—can never really lead to a very acceptable solution to occupational, let alone other disease problems.

Dr. ROBERTS. As you appreciate, the panelists are working on audience time. Whoever wants to be heard, this is the time to manifest your desire. Phil?

Dr. ENTERLINE. I suppose I am working two papers back here. I suppose I would comment on Nick Ashford's comment on resistance to fear. I don't know if there is all this resistance. Maybe we just lack information and maybe that will lead into the comment I want to make on George Becker's presentation.

What we don't have on lead workers are good epidemiological data that show people exposed to it have a tendency to get kidney disease. Let's suppose we had that kind of evidence. Let's suppose it shows that

these workers have three times the tendency to get that disease than the normal population. I think as you mentioned, you have so many cases out of so many workers. If you knew that, that could lead to a standard having to do with lead and kidney disease and one could say as a result of that, any lead worker who has kidney disease should be compensated.

Now, getting back to my statement about probabilities. If lead workers have three times as much kidney disease, that means, if you compensate all lead workers for kidney disease you would be right two out of three times.

I am presupposing we are dealing with a disease that it is impossible in a specific case to know what the etiology is. There is no such thing as lead workers' kidney disease and nonlead workers kidney disease.

But, to bring it into perspective, I think, I suppose what I am saying is, we need more information on which to act, and if we have that information, it would move the workers' compensation system in the right direction.

Dr. ROBERTS. Thank you. Dick?

Mr. SCHUBERT. I am not sure whether this is the proper time to do this or not, but it takes on Howard's comments of 20 minutes or so ago—Mr. McMahan picked up part of the theme again—Nick Ashford picked it up yet again—and I have got to try again today to articulate something I attempted yesterday without much success, I guess. And it is really the very basic and fundamental concept of the conference, I think.

If we were to ascribe an ultimate purpose for this conference, I guess it would be to try and determine how society should deal with occupationally caused or related diseases, with a secondary focus on the workers' compensation system.

The workers' compensation system is essentially an income maintenance scheme that is unique from several standpoints, but particularly because the contributions come from one source, and that is industry.

Now, talking about presumptions or the definitions, and I am not sure there are substantial differences between presumptions and definitions, and even a guidebook or guideline which is imposed, as opposed to simply for the purpose of advising counsel.

When you look at all these concepts, you see a theoretical spectrum that runs on the one side from a definitional or presumptive approach that would say that all diseases that occurred during the time a person is in the work force from ages 17 to 65 ought to be covered in some fashion by workers' compensation, regardless of the origin.

Dr. Selikoff was most impressive, at least to me, yesterday, as a novice in this area, when he demonstrated the increasing evidence of multiple causation.

So, one end of this spectrum is that everything that occurs to a person during the time he or she is part of the work force that generates or results in a disease, ought to, in some fashion, be compensated through the workers' compensation program.

The other end I suppose is a very, very narrowly oriented one of a one-on-one causation type of approach. Unless there is all the indicia

that will tie a particular generation into the work force, it is not covered by workers' compensation.

It seems to me that there are some policy downsides that ought to be considered at least, at the end of the dialog, it ought to be considered, in choosing the first end of the spectrum.

One, there is a diversion of potentially unreasonable quantities of industry resources away from the maintenance or expansion of facilities. Which activity is job creating and job maintaining. And given the necessity we have for economic growth in this country over the next 10 years, or 8 years, 10 million additional jobs, anything that diverts very substantial resources away from job maintaining or job creating has to be considered at least.

And some people would argue that the requirements of the environmental area, right now, outside environmental and environmental health, are substantial enough to raise a significant question, as to whether we can meet the economic growth needs of our country.

The tacking of a very, very broad kind of comprehensive definition of occupational disease, whether it is 100,000 or some other figure, and assessing that to industry, may conceivably be the breaking point.

Second, from a real world, very practical political standpoint, there is no way in which a Federal approach of the type many in this room would support ultimately coming out of this conference, can be adopted with that kind of very, very broad comprehensive definition. In fact, I think if you move down that corridor you shoot this thing out of the water. I think that is just as clear as we are sitting here.

Third, and I personally believe some kind of State or Federal approach is probably justified—speaking as an individual and not as a representative of industry—third, is we move away from the historic notion that workers' compensation ought to provide some kind of incentive to the employers to improve their work place.

The more definitions—the more copout is provided for employers that say, I don't know what causes it, hence I don't really have to do anything about it. It is not really part of my moral, legal, or economic obligation. But, if an employer can't do anything about a problem, he shouldn't be stuck paying for it. That doesn't mean someone shouldn't pick up the obligation in society.

Maybe a better line is we ought not strive toward the broadest conceivable definition approach in this area, rather we ought to broaden it somewhat, but what doesn't fall within some kind of rational study definition of causation, ought to be picked up by some other forum, whether social security or a national disability compensation system, but some other mechanism in society that will prove some kind of orderly distribution of cause between industry on one hand and society on the other.

Dr. ROBERTS. Thank you very much. We are at that time where I am charged with making some summation comments. Rather than try to summarize what has gone on, I would like to comment about two or three specific areas.

I guess it was inevitable—when we get together people who have primarily legal backgrounds and are charged with administrative

responsibility and decisionmaking in relation to compensation—when we get together people like Nick who have concerns about doing what they are convinced is socially right—when we get together people from industry and labor—we would all be bringing somewhat different viewpoints. I would suggest we all share the same objective. We just look at some approaches somewhat differently.

I would like to emphasize one thing we haven't given an awful lot of thought to. That is the need for better information on which to be progressing efforts in this area. It is amazing that in 1976 we have so little data that can correlate the worker's exposure throughout his career with his morbidity and mortality experience itself. We should have such data, not only with respect to occupational exposure, but other things that may correlate with the morbidity and mortality experience.

Our need, therefore, is for immensely more and better population studies or epidemiologic studies than we have done and we have available.

To be realistic, we have to acknowledge this is, this type of work is very much more complex and very much more difficult to accomplish—very much more expensive in the time you consume of the talents of people as well as dollars than most of us appreciate.

The end product is not as interpretable in the sense of cause and effect as we would like it to be. It can lead us to know and identify, to the identification of things that require study which may more definitely prove a cause and effect relationship.

It is still, to me, the need for more and better population studies, still is a tremendously promising area we have not moved sufficiently. We have got to support it, I believe.

I can't resist making comments about the company doctor problem for obvious reasons. It is sort of a self-fulfilling purpose.

We have great recruiting problems as it is. The more the company doctor is condemned broadly, the less attractive this is as a profession. After all, it is a very unusual field for a physician to follow as a career, and it is not easy to divert people in medical school from the traditional bag of dealing with crises-related medicine. It is very, very hard to interest young people in medicine in coming into this field.

In my mind there is little doubt about the fact that condemning company doctors broadly, as much as is done, is counterproductive. The question is, what would be more productive. And, I am not at all denying much of the condemnation of management and the medical personnel we have heard here and hear and read in the newspapers, is justified. There is little doubt there are sins being committed, and something ought to be done about them. I am not sure I have heard many very helpful suggestions. One of the most encouraging is a process of accreditation. As you may know, many professional agencies have joined together with some help and support from NIOSH and organized labor, which counseled us on it, and we are trying to come up with a valid tool for measuring the competence and integrity of occupational health programs that are supported by corporations.

If we look back on the accumulated knowledge and accomplishments in relation to health, the protection of the health of the worker, and ask ourselves who has come to support it, we can begin with people like we have at this table, we have contributions by governmental

agencies, organized labor and other groups, but the vast bulk of what is known and done, and is good, to me, that has been done for the protection of the worker, I would submit to you, the vast bulk has come out of industry supported programs. You pay for that. You pay for that when you buy our product.

But I do believe management can be persuaded to believe that the only way they can recruit and maintain competent professional physicians or professional medical people in their employ is to let them practice their professions honestly.

I deplore as much as Tony does the professional who becomes a whore in anybody's employment or in any capacity, but believe me, I hope we don't throw out the baby with the dirty water.

That is the end of our morning session and we have 1 hour and 15 minutes for lunch.

[Whereupon the luncheon recess was taken.]

AFTERNOON SESSION

Chairman BUNN. One of the members of the panel on this afternoon's agenda is not here, that is Mr. J. T. Noblin. Mr. Noblin had to return to Mississippi to testify in some hearings concerning workers' compensation in the State legislature. He will be back in the morning. However, in order to stay on schedule, his paper will be presented by Mr. Lewis who will also present a paper of his own earlier in the schedule. We have contemplated whether or not to try to deal with this by delaying it until morning, but due to the fact our schedule continues to be very tight, we felt it is going to be mandatory on us to proceed along the lines I just outlined.

In dealing with this afternoon's session I want to begin by reading to you the issues—and this is directed specifically to the panel—that we want to get insight into and a consensus if at all possible. So I ask you to pay attention to the issues. They are critical.

First of all, is there a significant distinction between the occupational disease as commonly defined and work related diseases as cited in the national commission report.

Second, is workers' compensation as a system helping or harming efforts to identify and assess the magnitude of the occupational disease problem? How and to what extent are the State procedures for determining occupational disease compensability resulting in denial of claims in which the described disease is partially or totally work related? How can this be remedied?

Is it true as it appears that the burden of proof of causality of occupational disease rests with the claimant? If so, is that where it should be?

What kinds of problems might Federal legislation to deal comprehensively with handling of occupational disease within workers' compensation best address?

What have been the problems in the use of class legislation, for example, the black lung program?

What lessons can be drawn regarding possible Federal legislation?

What kinds of administrative structures, systems, and procedures are needed in determining causality?

All of these issues will not be addressed today, but that is the full gamut of them. From time to time during the afternoon you can expect that I may restate some of the issues in order for us to try and focus in on them.

The first paper this afternoon is being presented by John H. Lewis, who is the former chief counsel to the National Commission on State Workmen's Compensation, and is at the present time a practicing lawyer in the State of Florida.

Mr. Lewis.

Mr. LEWIS. Thank you, Howard. I wish I had had an opportunity to write this paper at lunch instead of several weeks ago. As I sat here over the last few days and listened to the comments, I learned a couple of things.

First of all, I was somewhat pleased to know many of the thoughts I had, which were expressed in the paper, were also mentioned by other participants here, and I am glad to see great minds run in the same track, or whatever the phrase is.

More importantly, after listening to many of the viewpoints expressed, I feel that I have at times been shallow in my thinking as to possible remedies to problems, and perhaps have not recognized some of the problems which exist in some aspects of the compensation system. And, if nothing else, I am thankful for this conference for giving me a somewhat broader view of the problems of occupational disease and the problems faced by participants in a system other than the participants that I generally deal with.

Since I am going to be, in effect, presenting two papers today, I think it is perhaps appropriate that I emphasize that my feelings concerning the legal aspects of occupational disease coverage in workers' compensation is somewhat broader than what most individuals might consider the legal aspects. I feel quite strongly that legal aspects are only a part of the overall administration of workers' compensation claims in general, as well as in the occupational disease area, and, as a result, I don't use the term administration as narrowly as perhaps in the classic sense; that is the State agency itself and its activities.

I believe quite strongly doctors, lawyers, technicians, all are in effect administrators within the sense of administering the workers' compensation program, and they all have a responsibility or degree of responsibility to the system.

I guess I should also mention I don't intend to sit and read the paper to you. I would like to generally summarize it, perhaps being able to modify my views somewhat by giving you my comments on the paper coupled with my thoughts as they have developed through this conference.

The first major area of concern in the area of legal aspects of workers' compensation and occupational disease is the question of a definition of occupational disease itself. We have spent considerable time on that issue and I think it has to be understood that, when we talk about a definition, there will be several definitions depending upon the purpose for which we are seeking a definition. We must have statutory language to bring occupational disease and occupational injuries into the compensation system.

In occupational injury, for the most part, the term is an accidental injury arising out of or in the course of employment. For occupational diseases, there is a much broader range of definitions.

In the early days of compensation, workers' compensation, there was quite a trend, or what you saw most often were schedules. That is a listing of specific names of diseases as being occupational diseases. Over the years we have gotten away from that to the point where I believe there are now only four or five States which limit occupational disease coverage to a list. The others either provide general coverage or a list and a catch-all provision.

And as a result we hear much talk of full coverage of occupational disease, and I submit to you despite the improvements which have been made, we still have not really arrived at a full coverage of occupational disease.

While we may have covered the overwhelming majority of cases, we still haven't faced up to some of the issues which arise when you attempt to determine whether you are providing full coverage.

The reference in my paper to the report of the National Commission I think make the issues somewhat clear, in fact very clear. The National Commission in referring to full coverage meant, and I think they indicated quite clearly, "work related," or a disease which was subject to the same tests as an injury—"arising out of and in the course of employment"—but as we all know, a good number of States, a majority of States in fact, have definitions for occupational diseases which are other than "arising out of and in the course of employment."

As a result, you can see from some of the examples cited in the paper, you must show a degree of unusual exposure or a degree of peculiarity, or you must show that the disease was not one to which the general population is exposed—all sorts of statutory language. As a result, we have the possibility, if not probability, of work related diseases being denied compensability because of a lack of peculiarity or failure to comply with one of the other tests.

I might point out on page 4 of the document there are a number of typographical errors. The staff of the Task Force was helpful in revising this for me at the last moment and didn't have a chance to correct some of the typos.

But, after footnote five it should read: "A significant number of other States"—and in the last sentence it should read: "An absence of peculiarity."

Be that as it may, the case situation remains the same. There are employment related diseases which are not compensated.

The examples given, one of which is not particularly of great concern in the overall picture of workers' compensation, was simply a heat rash condition which, for the most part, is not particularly serious. The other case, the Morrison case, involved benzol poisoning, and I think that is a significant disease condition. Yet it was denied compensability in a full coverage State as a result of lack of peculiarity or a similar standard.

It is impossible to determine how many cases in fact are never brought as compensation claims or are denied at the lower level and not appealed because of the requirement in the law that there be peculiarity, unusualness, that type thing. The only time you really

get to see the denials are when they reach the appellate level in reported cases.

I am not contending at this time the ideal solution is to simply apply the "arising out of and in the course of" test. We have to consider whether such a test would in fact bring into the compensation system colds, which might be contracted possibly or possibly not on the job site, and other types of diseases that we would not want to cover because of the burden on the system.

For example, you might want to, in drafting an ideal definition of statute, exclude communicable diseases unless there was a showing of increased hazard or increased risk. And, I cannot recommend to you today an ideal definition. What I am saying is before we talk of full coverage of occupational diseases, we ought to really look at what the statutes say, what the case law says, and realize we are somewhere short of full coverage of occupationally related diseases.

Not only do definitions provide problems, but there are still at issue a number of statutory restrictions that treat occupational diseases differently than accidental injuries.

For example, many States, in fact just about half the States, have restrictive claim periods. That is a claim for occupational disease must be filed within a specified period from the last exposure, and typically that period is known to be 3 to 5 years. As everyone here at the conference knows, there are diseases which take far longer than that to develop and to become apparent to the victim. As a result, an employee who has been exposed to an industrial hazard and has somewhere down the road become disabled, he may be effectively foreclosed from obtaining compensation benefits, not because his disease does not fit into the definition, not because it is not occupationally related, but simply because it did not fit into the time period. It did not make itself apparent within the claim period the particular State's statute requires.

It is most unfortunate, and again we don't know the numbers, whether it is one case or a hundred or thousands every year. But, there are reported cases in which this occurs, so we know it is a consideration, something that must be faced up to.

Similarly there are exposure criteria which require that the worker be exposed for a particular number of shifts, or days, or years, or a 10-year period immediately preceding the onset of the disease.

Some of these criteria may be appropriate, but from my reading of the various statutes and my understanding of the medical aspect of the diseases, and they are primarily dust diseases, there really is no medical basis for establishing these criteria. As a result a clear occupationally connected dust disease may be denied compensation because of a failure to comply with the requisite exposure.

Finally, there are restrictions on the amounts of benefits which are available, or the kind of benefits available to either occupational disease claimants in general or certain limited diseases. These are becoming far less prevalent than in the past, and I think this is perhaps the area we are making the most progress in bringing occupational disease coverage up to the same level as accidental injury coverage. However, as long as they exist, I do not believe we can talk about the day of full coverage of occupational disease having arrived.

The reasons for these limitations and for the attitudes are, I guess, subject to much speculation. So far as restrictions you have to assume they were put there because of a fear of the impact of diseases such as silicosis back in the 1930's when it was feared if the gates were opened to compensability of silicosis and related diseases, on the same basis as accidental injury, you would have a tremendous burden on the system. It would kill the system. The same kinds of things, we are talking about today as being possibilities. So, those restrictions exist.

Also there have been thoughts expressed to the effect that occupational disease in itself means something other than work related. It tends to go back to the early days of compensation when it was thought there had to be some unusual exposure, unusual criteria for even accidental injuries. We have gotten away from that in the field of accidental injuries, and I think we ought to make an attempt to get away from that in the field of occupational disease.

Finally I think there is still serious concern which has been expressed today as to the financial costs of full coverage of occupational disease. What would happen if in fact we said that all diseases which arose out of and in the course of employment were compensable? I suspect we would have far more occupational disease claims filed now than we had in the past. Even without any change in the knowledge, medical knowledge in the field, the problems we have discussed here today.

I am fairly certain the fear still exists that if we treat occupational disease in the same way as occupational injury, the financial burden on the system would be so overwhelming the cost would be virtually prohibitive. I can't answer that. We apparently can't answer that today but that thought has to be considered in determining an appropriate definition and appropriate mechanism for dealing with occupational disease.

Once we get beyond the occupational disease definition problem, and hypothetically enact the ideal definition, we still have what I consider to be one of the major problems in the occupational disease question. That is bringing the worker into the system when he may have an occupational disease.

We have talked about that before in the past 2 days and I will not dwell on it to any great extent other than to say that it appears that the job is not being done to a tremendous extent.

Whether a law can be passed to require employers to provide employees with sufficient information to make them aware of the possibility of occupational disease is for the time being somewhat of a political question, and I despair such limitations being enacted in the near future. As a result, we are going to have to rely on other mechanisms, mainly educational mechanisms to bring to the public, to the employees the knowledge that is necessary for an attempt to get into the compensation system when he is suffering from a disease. This means unions have to undertake substantial educational processes—doctors, and perhaps this is the most important area, have to obtain either better information for themselves or better access to information so that they recognize the possibility of occupational disease claims when an individual is in their office for an exam, or at least know what questions to ask.

While discussing the compensation problems at lunch with some individuals, the Kepone problem was mentioned, and I found out that when individuals with the symptoms of Kepone poisoning had gone

to physicians they were undiagnosed, at least in terms of relating the symptoms to the exposure to the chemical. It was attributed to nervousness, alcoholism, pleurisy, all sorts of things, until one physician who did not feel he was that well informed decided to go to the books. When he went to the books, all of a sudden he discovered the possible connection with the employment.

There has to be more emphasis placed on investigating the possibilities of employment connection and disease. If the doctors cannot or will not do that, we are going to be in substantial trouble in terms of getting appropriate employees, those who may be suffering from work related diseases, into the system.

The administrative agencies have to take part in this. Lawyers groups—attorneys have to know enough or know where to look to at least properly advise somebody when they come into the office that, yes, you may have an occupational disease.

I am hopeful that employers in the future will take a more positive approach than some of them have taken and realize in the long run it is in their best interests to keep employees advised of potential hazards, because at some point in time, I suspect, they are going to have their secrets exposed and going to be faced with either remedial legislation that could be extremely expensive or vast numbers of claims that were unanticipated.

There is also the very real possibility of lawsuits against employers despite the existence of the exclusive liability situations of most State statutes. There still exists opportunities to bring suit against employers for things such as intentional concealment of occupational hazard. I don't want to express my guess as to how the courts would rule on these kinds of issues, I would merely say courts are not totally unsympathetic and the mere existence of exclusive liability provisions in State laws do not mean that an employer is totally immuned to suit.

There have been ways found in the past to get around these provisions, and I suspect if the problem becomes apparent enough the courts will develop doctrines which will make employers much more aware of their responsibility to the individual employee.

Once we get the employee into the system we have a number of problems. The main problem being the ability of not only the worker, but of the system itself to obtain sufficient information upon which to make an educated decision as to the compensability of a particular disease condition. We have talked about that many hours during this conference and apparently we have not as yet resolved the question. In fact, perhaps we opened up more questions than we have resolved.

I would indicate though, we have to consider several aspects of this problem. First of all, disease for legal purposes might be classified in two categories:

One category consists of those diseases which are large-scale problems. Large numbers of employees are victims of such diseases. They are well known to the medical profession, legal profession, to State administrators, and are not the kind of thing you see once a year. You see them once a week or once a day. Those kinds of diseases cry out for guidelines, some kind of formalized assistance in reaching decisions as to compensability.

I would like to indicate that it is not only for the purpose of reaching decisions in contested cases that I feel guidelines are necessary.

We have to try to do what we can to keep as many cases as possible out of litigation. We should, if it is possible, provide claimants, doctors, employers, insurance companies, with information that will permit them to make better judgments as to whether a particular disease is compensable.

If we can, for example, convince employers that because of certain guidelines and criteria being fulfilled the chances of a particular claim being denied are remote, we might well convince that employer to accept the case voluntarily and stay out of the system.

What I have learned today is that it may very well be there are no guidelines, no diseases for which we can come up with these kinds of—I hate to use the term standards—but for loss of a better word. I am not certain we have really gone that far from the possibility of devising guidelines and standards. It may very well be certain diseases for which the medical evidence is so, it is slim or in dispute, that we cannot devise any assistance whatsoever, no guidelines, no criteria.

But I am convinced also that there are diseases for which certain criteria can be developed. That is, we know for a fact, if you have got x amount of exposure and develop a disease, the chances are overwhelming that it is occupationally related. Similarly, if you do not have y amount of exposure, the chances are overwhelming it is not occupationally related.

I am hopeful we can make such guides available and if appropriate enact them by law or regulation and make them a part of the compensation program, that is the administration of the program.

If we are left without any guidelines and have to, in effect, litigate every single compensation claim in the occupational disease area, we are going to be in serious trouble.

In many cases I know the guidelines are not going to be effective. They are not going to be appropriate. And those cases will have to be litigated. But, I urge that there is still much room for development of appropriate guidelines, of finding a meeting ground for the competing interests, and developing some sort of assistance, perhaps not mandatory, but at least assistance for those that have to make decisions concerning compensability. Employers and carriers have to make those decisions as well as the adjudicators.

In terms of enacting presumptions and shifting the burden of proof—we have talked about that today—I personally, as I express in my paper, do not put a whole lot of credence on the theory of shifting the burden of proof. When you contest a case, I am convinced the bottom line is the quality of the overall evidence presented and not the presumption itself. A factfinder can pretty well get around presumptions unless it is irrebuttable or so narrowly defined that there is virtually no room for a judgment on the part of the factfinder.

We have to be very much aware of the black lung experience when we talk about enacting presumptions or developing presumptions or guidelines that have evidentiary value or statutory significance. It is my understanding of the black lung program that a deliberate choice was made to in effect overcompensate rather than undercompensate victims or possible victims of what is known as black lung. And that the net was made as inclusive as possible as opposed to being restrictive.

It appears that is one of the major areas of dispute is whether or not the act is working as it should. I suspect that politically, if for

no other reason, the chance of enacting legislation such as black lung legislation in other occupational disease areas are rather slim. And that if we want to get anywhere we are going to have to talk about much narrower presumptions.

I am not saying we should eliminate from the compensation system those that do not fall within the presumptions established for a particular disease. We may have to let them be litigated on a case-by-case basis without applicability of the guidelines. But, for the most part, the presumptions are going to have to be narrowly construed.

There are still other kinds of diseases that are just not significant enough in terms of their incidence to be subject to the proper amount of data that is necessary in order to enact guidelines. Those kinds of cases are going to have to be decided on a case-by-case basis.

What we have to concern ourselves with there is bringing into the system all the available data, all the available information that we have. I think there has been far too little use made of data banks, information trades, sources of medical knowledge, within the compensation system.

We are all familiar with these kinds of sources. Yet, I have seen very, very little in terms of attempts to bring this kind of procedure into the compensation system. I think doctors and lawyers and administrators and carriers have to get together with the Federal Government and decide where we have access to information, how this can be best compiled and made available to State administrators, to attorneys who represent individuals, whoever has a concern as to bringing these various information sources into play.

If we do not get all the information that is available into play in a particular compensation case, then we are sort of flipping a coin and I don't want to do that. We want to try and allocate disease awards to those who truly have occupationally related diseases and not over-compensate if we can avoid it.

Finally, I think there is a major decision which Dick Schubert for the first time mentioned today. That is, we are going to have to decide whether or not comp is appropriate for dealing with occupational diseases. I happen to think comp is a viable system. And it ought not to be kicked out. However, there is major concern if we start taking bits and pieces, such as occupational disease, out of the comp system, that is only the first step to eliminating comp as a separate entity. That is a danger. I believe is a danger that we have to be aware of.

In the same token, we cannot let the occupational disease problem destroy what may be a very viable compensation system for other types of occupational problems.

We are going to have to decide whether there is enough medical information available to assign faults; we are going to have to decide if comp is going to be left to bear the costs, the true costs of production; or are we going to assign other burdens to it; or are we going to require that the comp system compensate for diseases which are maybe 1 percent the fault or caused by employers and 99 percent the result of other factors.

These are hard questions and I suspect we are a long way from even formulating all of them, but they have to be faced up to. If they are not faced up to, we are going to have a decision based on far less than

complete understanding of the problem, and most likely will wind up with a patchwork of programs that will be totally unacceptable in the long run, and will result in, I think, the destruction of the compensation system as we know it.

Thank you.

Chairman BUNN. Judge Novicoff, for a response.

Judge NOVICOFF. First of all I want to start with an expression of thanks to John for his cooperation in getting the final draft to me. It was very helpful.

Second, I think I must say I agree with most of what Mr. Lewis has said today and most of what he has in his paper.

In my discussion I intend to refer to other comments and papers of other people in addition to Mr. Lewis'.

As to Mr. Lewis' paper, I think it is necessary for all of us to understand and for me to further define for you the phrase mentioned in Mr. Lewis' paper: "Arising out of and in the course of." "Arising out of" usually refers to origins of the cause of the injury. And it is descriptive of its character. While the words, "in the course of" refer to the time, the place, and circumstances of the injury.

Now, Mr. Lewis says in his paper that the National Commission said, and I quote: "Most States have therefore amended their statutes to provide full coverage of occupational diseases." And from this he implies that they were wrong. That isn't true.

The fact of the matter is the whole sentence in the National Commission report said:

That most states have therefore amended their statutes to provide full coverage for occupational diseases in compliance with the recommended standards published by the Department of Labor.

I finally found that reference and in there, one of the examples used in the Department of Labor's recommended standards, and this preceded the National Commission, the example cited as to a State law that they felt met the standard, and it said, "Disability arising from any cause connected with or arising from the peculiar characteristics of the employment." The point is, if there is a disparity, it is not in the recommendation of the National Commission, but rather in the definition of occupational disease that is used in most States.

But, I think I should make the point it is not necessarily unreasonable to exclude ordinary diseases of life to which the general public are exposed. For example, the common cold is used as an example by Mr. Lewis in his paper. I am sure almost everybody in this conference knows that the common cold is usually contracted through short exposure to someone carrying the cold virus. That is accepted as true.

But, let me read to you part of an article that appeared in newspapers around the country on February 3, 1976, and it said:

A new study has shown that the natural transmission of cold viruses from one person to another is much more difficult to achieve than many people might think. It seems to take a severe cold and many hours of togetherness between the donor and recipient.

The article went on to say:

The person-to-person spread of viruses is unpredictable and difficult to detect even though respiratory virus infections are widespread in the whole community.

I think this illustrates the dangers in accepting the premise that everything that may occur on the job is necessarily related to the job. Can you imagine the result of a presumption that would allow compensation for colds that manifest themselves on the job, even without the presumption? Can you imagine the litigation resulting from acceptance of the concept that all work-related diseases should be compensated?

I agree with Mr. Lewis when he says in the paper the unknowns certainly play a significant—and I must say, to say the least—a significant role in consideration of the intended scope of occupational disease coverage.

Any change in the usual definition of occupational disease must be approached very carefully. May I suggest a definition to you, and Mr. Lewis has already stated it, and it comes from the Council of State Government's draft on workers' compensation. It says:

Injury means any harmful change in the human organism arising out of and in the course of employment, but does not include any communicable disease unless the risk of contracting such disease is increased by the nature of the employment.

Presumptions would have to be approached carefully, and I submit to you much more so than those that now exist in black lung. This is not to say presumptions are per se bad. Right now there are presumptions in the law that affect workers' compensation: for example, there is a presumption against suicide; and in cases of unexplained death, where death took place in the time and place of the employment, most courts will infer or presume that the death arose out of employment. But, these presumptions are based on logical reasons and are rebuttable.

The unexplained fall cases are usually compensable. And indeed, there has to be a presumption used, otherwise it could not be said that the claimant sustained his burden of proof, but there is a difference between accidents and diseases.

In accidents there is no question about in the course of. And the presumption goes only to the question of did it arise out of or the causality. In diseases, a presumption would almost always have to go to both arising out of and in the course of. I submit in black lung it goes even further; even though there is no disability, there is an entitlement.

In an accident there is almost always an immediate cause and effect relationship.

I do not agree with Mr. Lewis that most cases with presumptions would boil down to a question of believability. For example, the presumption against suicide under the circumstances that I mentioned are extremely difficult to overcome.

Now, I thank John for not putting me in the incompetent administrative group, but in his paper he makes the implication and earlier said this, that factfinders, adjudicators, administrators to some unknown large extent are incompetent. I don't agree with that. I happen to know a great many of them and with very rare exception they are dedicated and competent.

Each claimant that is turned down and his lawyer think the adjudicator is too conservative. And every employer-carrier that has an

award against him and his attorney, knows the adjudicator is too liberal. Almost without exception every administrator I met wants to do the best possible job. And a conference like this, if it will stick to its stated objectives, can be of great help.

Recently the I.A.I.A.B.C., which is the organization of the administrators, started a workers' compensation college. The reason for it was because of something that Mr. Lewis alluded to, the appointments, changes in administrators, adjudicators, that come about because of the political process. We felt that a college such as this could speed up the learning process of the administrators, of the adjudicators. The response has been beyond our wildest dreams. This is just one example of the administrators' dedication.

The very existence of the I.A.I.A.B.C. is another example of the administrators' desires to improve the state of the art, and it is truly an art.

I agree with Mr. Lewis it is the people involved who determine the success or failure of the program. And I think it is important for us, all of us here, to understand that there are many things involved in administration, legal aspects of State board commissions or courts. It would be impossible, I think, to overemphasize the importance of effective administration to the success of any workers' compensation law. No act regardless of the high quality of its substantive content, can accomplish the objectives or even approach the objectives of the workers' compensation system, if that act is poorly administered.

The main purposes of administration are:

1. That the law is understood by all of those who are affected by it.
2. That those persons are aware of their rights and obligations, and
3. That their rights and obligations are enforced.

The fulfillment of these purposes involve many functions apart from the resolutions of dispute. The fact is that most compensation claims are not contested.

Included among the necessary administrative functions are: dissemination of information to employees and employers; supervision of benefit payments in uncontested cases; surveillance of compromises in cases where a dispute exists; continuing supervision of awards, sometimes over long periods of time; the encouragement of and assistance in rehabilitation of injured workers; keeping of accident and illness records and related data; compiling statistics about laws operations and its defects; and finally, making a recommendation to the executive and legislative branches of Government.

After over 60 years of the program, it is my opinion that the present program has proved its worth. It has and it still is progressing. And although some here may think I am riding a dinosaur, I believe my dinosaur is still very healthy.

Information banks as proposed by Mr. Lewis are in my estimation an excellent idea, as is the college that I mentioned.

The guidelines for decisionmaking is a good start. It may need a lot of work, but I think the concept is excellent.

I think one thing, though, that has been mentioned, is it would require constant updating, and I think the dangers and reservations expressed by some that this would become a Bible, and become the final thing that adjudicators would rely on, would not come about. I

don't think any competent adjudicator would take it as gospel. They would use it, and I think it would be an excellent aid to decision-making.

I hope that other sound and workable ideas will result from this conference, and if nothing else, that the conference will stimulate a task force consisting of representatives of labor, industry, insurance, the medical and legal professions, and State administrators to develop guidelines to help solve the problem.

I also hope the theorists will come down from their ivory towers and give us that want to do the job a practical approach to the problems rather than creating more problems by unworkable and unacceptable pie in the sky speculative suggestions.

There seems to be with some here, a preoccupation, at least with some of the attorneys and with others, a preoccupation with money in workers' compensation. Statements were made such as, the only thing that can come from workers' compensation is economic justice. If true, would be an indication of workers' compensation failure. Workers' compensation is not and should not simply be payment of money.

It includes safety and prevention as mentioned by Dr. Discher and I disagree with the statement that workers' compensation doesn't work to promote safety. Experience ratings in workers' compensation, I think, do promote safety.

It should include proper medical care and treatment; it should include payment of money; it should include rehabilitation; and, finally, it should include job placement. All of these things go into a good workers' compensation program.

Thank you.

Chairman BUNN. Mr. Kalmykow.

Mr. KALMYKOW. Mr. Chairman, gentlemen, I think John has raised one of the most important considerations that this conference has today, and that is, what is an occupational disease? What kind of condition? What kind of diseases are to be brought within the compensation system?

And, I think probably the greatest contribution that this gathering could make is to indicate some sort of cases should fall reasonably within the compensation system. Once we come to such an agreement, then we can devise a language which will best serve to bring those kinds of cases within the compensation system, and then also to devise a mechanism which will best serve to make compensation payable promptly with a minimum of difficulty and effort and litigation.

Now, in my mind there are three groups of diseases. Diseases that we have discussed.

One group is clearly occupational in form. And that is a group we have been addressing ourselves to for at least a day and a half. This would include conditions due to exposure to toxic substances, occupational dust diseases, dermatitis, conditions due to repeated trauma, physiology, and so on and so forth, and I am sure I don't have to describe the types of conditions, we are all familiar with them.

The other extremes are diseases which I feel are clearly nonoccupational. I believe you will agree, John, some diseases are not occupational. I am inclined to put in that group myself, childhood, most cases, usually childhood diseases, contagious infectious diseases of

various types, venereal diseases—but, I understand this one could be brought under the law—obviously I wasn't thinking of all occupations.

But, then there is another group and that is probably the most important and one to which we have to give very serious thought.

And that is the group of diseases which we describe as: the etiology of which is unknown or which was clearly nonoccupational, but to which, with development of which—you used the word aggravation this morning—and I think that is a common word which means some sector in the employment may have activated or created greater disability or what have you.

And it is there that we must address ourselves and try to find some lines of demarcation which are reasonable and which are fair to the working man and fair to industry, and that is probably the most difficult kinds of guidelines to reach.

Some state courts have said mere aggravation of a disease does not make it occupational. But, even in those States, when you come to a practical case, that doctrine is not really seriously enforced.

So, I think it would be helpful if we could make some sort of indication as to when and if conditions of that type should fall within the compensation system.

I think, I forget who said, maybe it should be 50 percent. I don't know to what extent, where the line should be drawn. Some people might say some substantial factor in the causal relationship in producing disability before it is held compensable.

There are many, many conditions in the course of work that affect people, affect an individual. Say a man has a cold. The mere fact of going to work may aggravate the condition. I don't think that is enough to make it compensable.

On the other hand, if you have a lineman who goes out and works in a sleet storm, I think fairness would argue he should be compensated. I think he is.

It is a question of what we mean by the phrase "arising out of and in the course of employment" I think informed questions such as this should express thoughts of what reasonably can fall within that category.

There are some States that attempt to apportion benefits based on occupational and nonoccupational causes, but I think provisions like that are of very little value because they are not actually applied and it puts an uncomfortable burden on the administrator and anyone else trying to weigh these factors. I think there has to be compensability or not.

I am just expressing a personal opinion so far as that is concerned.

Another question which frequently arises is a question of a condition which may or may not be related to the employment. In other words, the same disease can be caused by a work factor: it can equally be caused by a non-work-related factor. Probably the most serious type of cases are malignancies and respiratory conditions. Some, of course, as we discussed at great length, are of known carcinogen. These things unquestionably should be in the system. Then there are those we know which are not. I think if someone had exposure to some of the substances that most administrators today would hold the condition compensable. If there is any substantial exposure to carcinogens I think probably they would pay.

Now I do say that we talk about presumptions. Malignancies are, I believe, the second highest cause of death in the country, and respiratory diseases are the fourth highest cause. Now, in most of these instances, we can't be sure what is the cause of a condition. If we accept the presumptions, then we bring them all into the compensation system. Maybe that is the thing to do. But, we ought to be aware of what we are doing when we are doing it. I think if we bring everything in we reduce it to such a low minimum that we are talking about abolishing the distinctions between work and accident conditions and nonwork and accident conditions.

It is costing the Federal Government now something like \$1 billion a year to pay \$190 a month to a single man and something like \$390 a month to a man and his family. In my mind those are inadequate benefits. If that is what you want to pay to everybody who gets occupational disease—that is a man who is exposed to a, well, take vinyl chloride or any of the other very severe toxic substances—Kepone for that matter—if that is all you want to pay him because you want to bring in a lot of people whose relationship to employment are entirely questionable, that is a choice we have to make.

I had a list of toxicants, I forget, page after page, and in this proposed guide, if we are going to put \$1 billion tax on each one of them, I don't know where we will end up.

But to go to some specific questions that have been raised, I think the question of a medical board is a good one, but it has mixed results—it is a matter of the quality of who is on there. Not everybody can be expert in every type of disease. So, I am inclined more toward an impartial specialist; a truly impartial specialist that knows what he is doing.

Another possibility which is helpful is to have one referee to handle occupational disease cases. After a while he gets pretty knowledgeable and he knows pretty much what the score is and he can make pretty fair decisions.

John ended up by asking whether or not the compensation system is going to cover occupational disease or not. I have reached an age where I can look back and first I remember when no diseases were compensated. We have come a long way today. I think we have solved a lot of problems, but I think we are smart enough and fair enough to reach some pretty reasonable conclusions. This will help us achieve our results.

Chairman BUNN. Thank you, Mr. Kalmykow. We will proceed to the roundtable discussion.

Mr. Guy?

Mr. GUY. John asked this question and several others in the last 2 days about why cases are not getting into the system. And I think if we examine how the case develops we may have a partial answer. In the case of traumatic injury where an employee breaks a leg or an arm, he is in that dispensary within minutes. The company's physician attends him and the whole process begins. It seems to work very well.

On the other hand, let's take a typical occupational disease case. It develops along this line, I think: The employee is not feeling very well. He thinks he has a cold usually, and a viral infection, if you will. And he stays home from work. The next day he doesn't feel good

and his wife calls him in sick. Chances are as that case progresses that man may never return to work. The industrial physician may never see that case again.

The man will wind up in the hands of his personal physician, his family doctor who prescribes whatever treatment that he wants for a cold or viral infection. I have seen the reports come in many, many times and the standard answer is, he has bronchitis.

And somewhere along the line, maybe 6 months to a year later, the poor employee finally winds up in the hands of a specialist who starts to put two and two together. And then it may be 2 years before the case is ever filed and the litigation process starts.

In the meantime, the family physician has been sending in reports to the insurance company and employer so the employee can collect disability benefits and on the forms he diagnosed the case as bronchitis. In the little block: "Is the condition related to employment?"—which is on about every form which I have seen—the answer is, no. So, the evidence the claimant would normally use to build his case is now used against him. So that the case never gets within the proper framework is what I am saying.

Chairman BUNN. Other comments?

Dr. Roberts.

Dr. ROBERTS. While we would very much wish the average practitioner of medicine would be very alert to the possibility of occupational disease, I just—I am just not sanguine about our capacity to accomplish that. It is not the, the subject is not well taught at all and in the undergraduate medical school education you cannot squeeze even high-priority items into that curriculum. Unfortunately, it would be very, very difficult to teach, to be frank about it, because of the fact there are so many different substances and so many different possibilities that no physician could keep these things available in his mind for random recall and maintain a high index of suspicion and do it.

Now, there are expert people that would have the capacity, but I am afraid, to be realistic, that we probably are not going to see much significant improvement in that direction at all.

Chairman BUNN. I would like to raise one of the issues we started out with and kind of see if there is any possibility of reaching any consensus by the panel. And it is one discussed by Mr. Lewis and Mr. Kalmykow and Judge Novicoff. And that is the first issue: is there a significant distinction between occupational disease as commonly defined and work related diseases as cited in the National Commission report?

And really going beyond that, is it feasible to go to the approach of work related vis-a-vis occupational disease definitions, somewhat as a disease peculiar to one's employment. What are the parameters of the definitional process? What is the thinking of the group as to the parameters of the definitional process? What is the better type of definition? Should it be limited in some extent or as broad as Mr. Lewis tends to indicate?

Mr. KALMYKOW. I am not sure who you are addressing, but I am willing to express some thoughts in that connection.

I tried to indicate before when we defined terms, we ought to know what we want to cover. I don't care what you use—work related, arising

out of, or in the course of employment—it is the result. What cases do we want to cover?

I am not sure the use of the word is very helpful because, as John was saying, and I hope you don't mind if I make reference to our discussion, John, but we are not drafting a law here. We are just describing situations and that is how it is work related. And I have no quarrel with that except no compensation act I can think of uses those precise words. So, it hasn't as yet been accorded a high-court interpretation.

I think so far as—we have this ad hoc committee and it is felt that the broad coverage met the Commission's recommendation, and be that as it may, I think we have to make a decision of what we want to cover. I think if it is something on the job that substantially contributed to the man's disability, then it should be compensated. How you determine substantially, may be a difficult question.

For example, a question of a man with a loose retina and he has a blow on the head. Was it caused by the blow or wasn't it?

Then you mentioned some questionable practitioners. I heard of a case where one testified on one side of the aisle that it was causally connected and went over across the aisle and testified in no case could it be connected. That is the kind of case you run up against.

There are difficult problems that arise all the time, and I think it is the degree of relationship to the disability that we are interested in. If there is one, it should come under the system.

Chairman BUNN. Dr. Ashford?

Dr. ASHFORD. There is an analog in air pollution which is probably worthwhile repeating here. It is a difficult situation you really have on very, very polluted days. This happened in England with the great fog. You have a much higher rate of death from respiratory failure. Now, those people are usually aged and people already with respiratory disability. Did the high excess pollution or inversion layer kill these people or not? Death is a convenient demarcation line, but somewhat irreversible.

The problem is a little harder when you are just talking about a gradual deterioration of lung function short of death. In terms of contributing the causality, which of course as you indicate, is relevant to the extent that you want to decide how to allocate blame, cost, and so forth.

If you want to use the but for test—but for the pollution, but for the man lifting 400 pounds and not having access to a forklift truck, he would not have died. Then, I think a court wouldn't be too uncomfortable in allocating a sufficient part of the blame and cost and burden on the person responsible for that last factor.

But fundamentally, as Mr. Kalmykow indicated, you have to make a policy decision. Do you want the workers' compensation system to pick up this last string that causes the heart attack or respiratory failure, the deterioration, and if you don't, because the other people aren't paying their share, do you really have much comfort in treating all these cases equally unfair, so far as the consumer, worker, and citizen is concerned. If other systems aren't doing their job, is that sufficient reason for workers' compensation not to assume its responsibility?

Chairman BUNN. Mr. Mazzocchi?

Mr. MAZZOCCHI. How do you prove someone got something on the job? That deals with, of course, diseases we know of. Now, over the past 2 years the occupational diseases that made the most news were diseases we didn't conceive of even occurring in the population at all—angiosarcoma of the liver. When we went back and looked at one plant where we represented workers we found a third of all deaths were from vinyl chloride-induced cancer. A third of all the deaths. When we looked, and we only looked because we became aware of the problem when it was exposed in the Goodrich plant in Louisville. That is the way the system works now.

Now, how do you depart from that system? Well, there are certain things you can do and presumptions do come in if certain tests are established:

A use permit system that says if you are going to produce a particular substance you have to have certain controls in place before you produce that substance.

Now, you may choose not to follow that procedure and I see a disease growing out of that operation, or someone is shown to contract a disease that is associated with that type of operation even many years later, you presume that he contracted the disease on the job.

You are giving the employer a choice to set up the type of control mechanisms that we know can control emissions or almost reduce it to a point whether it doesn't occur. You can lay that out.

But, the suggestion that you can continue to allow people to do what they want in the workplace and then expect the individual, the worker, who as a result of these exposures comes down with a disease, and it is a very, very difficult task, of first of all even remembering that he worked in an environment that might have caused the disease—that is one of the major problems, and that is why he doesn't get into the system. The deck is stacked against the worker to start with and he is not going to come into the system.

The 3 percent we were talking about the other day will remain 3 percent, except in rare situations where someone goes in, which is very rare, and does an epidemiologic study and then attempts to find out where the workers are. For instance, let's look at one plant, another plant where we represent people. The epidemiologic estimate is 400 out of 900 will die of cancer. Now, not one single one of the cases would have gotten into the workers' compensation system simply because the worker went off and died of cancer not associated with the job. No way would there have been a compensation case in that plant, and that is a substantial number of people, almost 50 percent of the workforce, and we are not talking about any insignificant number.

However, in that situation, if you had in place, first of all, a definition that there was an association between exposure and disease, and that certain requirements have to be met—and I am not talking about standards because standards aren't ultimately developed for scientific and medical reasons, they are mostly political and economic reasons. Standards aren't promulgated to protect against cases, so far as we know.

Scientists argue, they say there is, we don't know what causes, at what level cancer is caused. We don't know how much of a particular

substance will cause it. That argument goes on. So, we are forced to say, well, you don't know, therefore we shouldn't be exposed to any because it may be a very, very little that can cause it. In fact, there is proof in cases of asbestosis of 1 day's exposure resulting in cancer many years later.

So, I am saying, if occupational disease is going to be compensable, you may have to recognize it. You can't recognize it unless it comes before you. It doesn't come before you unless the person is aware, and you have to sort of balance the scales. They are absolutely distorted at the present moment. The worker is on the far end and it is weighted against him. He must prove something that he knows nothing about, that the resources available to him know nothing about.

The first in place posture should be there are certain requirements, not standards, using the use permit system as I suggested. It says if you produce this, that and the other, you have to take precautions. They are not written standards. They are precautions that must be in play. If you choose not to exercise them, you presume that presumption can come into play. I think that is a direction that has to be dealt with if this question is to be answered adequately.

Chairman BUNN. June.

Ms. ROBINSON. I have the feeling we are tacitly converging on an agreement that we will each stay in our respective vested interest areas. The noble objectives of this conference notwithstanding, I think we are going to have to open up and give a little more if any of us are here to accomplish what we have said we want to accomplish.

I don't think we can work miracles. I think at a minimum we can begin, as Mr. Brooks said, to establish some common languages. And one of the big barriers in the language problem seems to be around the terms: occupational disease, work related, arising out of and in the course of employment, arising out of or in the course of employment. All of these issues get raised in conferences, cocktail lounges, lobbying, hearings, and here is an opportunity to explore them.

And I think we should take advantage of this opportunity and we should start at whatever elementary level we can begin with. I would ask, in a rephrasing of the question we posed, what consideration needs to go into determining what is work related and arising out of and in the course of employment? We have problems and we need to move on them. Can someone respond to this?

Mr. JOHNSON. I don't know that I can respond to it. I would like to make an observation. It is one with which I have been living for quite some time.

In the State of California, as you know, we do not distinguish between occupational disease and traumatic injury. We just use the word injury. Having lived with it for a number of years you become accustomed and I suppose there are many faults you don't see.

But, let me draw to your attention a figure that bothered me. That is the figure of 2 percent. I cannot give you an accurate figure, but we know approximately 10 percent of the cases in California are the so-called accumulative injury cases. That is the type of case that involves the heart, lungs, back, and other occupational diseases as we normally think of them.

If that 10 percent is a good figure, and there is no reason to believe it is not, it would at least suggest, would it not, quite a few people

are beginning to be brought into the system. Maybe some consideration should be given to defining occupational disease in that manner.

Chairman BUNN. Mr. Lewis?

Mr. LEWIS. I think one of the problems we are continuing to avoid and perhaps is incapable of solution, is a determination of what the workers' compensation system is all about. I am afraid that over the years we have accepted as gospel many phrases that are used continually, and before, I feel before we can really assign responsibility for disease, and that is what we are talking about when we define the term "occupational disease," we have to decide what is the compensation system all about.

Is it really intended to force industry to bear the true cost of manufacturing—is one of the phrases you heard in the early development of comp—or is it really simply a manner for avoiding tort liability on the part of the employer.

If in fact we are attempting to force industry to bear the true cost of manufacturing, then a lot of the diseases we have talked about today and yesterday that are partially employment related and considerably nonemployment related have to be questioned in terms of whether the comp system should bear responsibility for them.

We used the term—let me back up—we also asked whether certain conditions which are due 95 percent to outside causes and the things the employee brings with him to the job, and caused only 5 percent by employment contribution, we asked if those should be compensated. And the answer is virtually always, well, of course, you take the employee as you find him. Says who?

That is a phrase we picked up from perhaps the 16th or 17th century in common law. It sort of has come through into the comp system.

I don't want to indicate I feel employees should be left without remedy in situations in which there are contributing causes, both occupational and nonoccupational. But, I am afraid one of our difficulties is the lack of an alternative to the compensation system.

I am convinced that one of the reasons that you see so many classified as "liberal decisions" in heart attack cases, in some disease cases, not all—I admit I have seen difficulties in bringing occupational disease claims—but one of the reasons you see liberality in favor of the claimant is that if the workers' comp system doesn't pick up the burden, no one will. And, there are very few adjudicators who can look at an individual, for example who had a serious heart attack and has got \$50,000 worth of medical expenses, which is not uncommon, and is looking at a lifetime of either low or no employment—it is very difficult to say it is not occupationally related, therefore I am denying your claim. Even though 93 percent of the responsibility is environmental factors, hereditary factors, everything but employment.

Quite frankly I don't know the answer to providing alternatives. I guess the next thing to come to mind is the things you heard about—health programs, guaranteed minimum income programs—things of that nature. But, as long as those alternatives do not exist, I suspect comp is going to bear the burden for things for which perhaps it is not responsible.

One of the possibilities I toyed around with in the occupational disease area is that perhaps there ought to be a separate, some type

of program for compensation for disease. And that is supplemental to the workers' compensation program.

Those cases which are obviously occupational and the employers in fact admit are, are handled in the normal manner through the workers' compensation system. Those diseases which are at least questionable are handled through the supplemental system. They are paid for through the supplemental system and then the administrators of that system can go and adjudicate individual claims against employers if they feel that is where the burden should lie. I also see about 1,000 problems with that kind of program.

Unfortunately, you don't seem to see many viable alternatives. Viable in terms of the ability to deal with the problems we see, buyable in a political sense. And as Tony pointed out, political realities happen to play a part in the things we are talking about.

What can we realistically expect the legislation and Congress to pass. And, as I say, I am afraid we first have to decide, under the realities of the 1970's, what it is we can expect workers' compensation to take care of and then form definitions.

I tend to favor the definition Judge Novicoff read because I personally feel that other kinds of restrictive language leads to the possibility, not the reality, of truly occupational related diseases being denied. I think that is wrong. Even if it is only one case, for that individual it is damned important.

But, I can also see in terms of the ability of the system to function, communicable diseases may have to be treated in somewhat different manner.

The rest of the legislation I see in effect, I think, belongs out of the system and definitions such as the one Judge Novicoff read ought to be the one that is used throughout the country, if possible.

Chairman BUNN. Doctor Amdur?

Dr. AMDUR. In answer somewhat to Ms. Robinson request, personally I would see nothing wrong with the definition of occupational disease: "arising out of or in the course of active employment, active and continuing employment, unless the level of disability stemming from that occupational disease is such it prevents a return to active employment."

What I have in mind is this, a very substantial number of occupational diseases that I am involved with are something that Mr. Guy spoke of:

That is a man who becomes ill, goes off on disability insurance benefits, and when his benefits are exhausted, a claim is made for occupational disease. Or, the man was ready for retirement, and as a means of supplementing his retirement income a claim for occupational disease is made.

Chairman BUNN. Doctor Burton?

Dr. BURTON. Let me try a little pass at the question you raised about the definition of occupational disease in the National Commission Report and elsewhere. It seems to me one thing that is happening is that there is more than one common definition of occupational disease.

There is a definition which I seem to pick up from the medical profession which is consistent with the term as it was used in Nick Ashford's paper that says if the workplace makes a contributing factor to the disease it would be considered an occupational disease.

The other use of the term occupational disease, though, I think, is more common in workers' compensation. It says that, what you mean by occupational disease is a disease which is peculiar to a given employment, or some other restriction on the type of disease. In other words, occupational within the workers' compensation system is a limitation on the nature of the disease, of the type of the disease, rather than the source of the disease.

Those two distinctions, those two definitions, I think are a source of part of the problem to understanding what the National Commission's recommendation is about. I would say the use of the term work related diseases in the National Commission's Report is not consistent with the traditional use of occupational disease that has been used in the workers' comp field.

If you take work related diseases and look at the definition of work related in the Commission Report, it becomes a much broader concept than the occupational disease terms traditionally used in the workers' compensation field.

And I think this may be one of the things we should stress in this conference, is that one of our communication problems has been pretty clearly the different uses of the same term, occupational disease.

Ms. ROBINSON. Let me follow up on that. I agree with you. But I think if we can begin to even identify some of the semantics problems, it would be useful. In what you said, I follow you. I wonder, given today's problems with multiple factor interactions, unknown etiologies, but obviously occupationally related illnesses that are noninjury, which term is better? Is there a better term? What best serves the purposes of today's needs? Which, I am sure, would require some change in thinking and possibly in law in certain States.

Dr. BURTON. We are kind of jumping to the end of the conference.

Ms. ROBINSON. I still want definitions.

Dr. BURTON. It is impossible to answer that without opening up the whole issue of whether occupational diseases can be handled adequately within workers' compensation.

There is no doubt—you have many diseases for which compensation can be paid on the basis that the workplace contributed to the occurrence of the disease. I think in the context of 1972 or 1976 that recommendation is a viable one and one I would still stand by.

I think, however, if we are going to look ahead 5 or 10 years in workers' compensation, that this kind of a view, this kind of definition, and this kind of program may not be viable.

Ms. ROBINSON. But we do have to deal with the problems today.

Dr. BURTON. Well, I would say, yes, we do, but I presume one of the purposes of the conference is also to lay out some issues that need to be looked into, because unless some planning is done now, thinking done now, 5 or 10 years from now we will have another conference and come back and be faced with the same kind of confusing issues.

I frankly think this is perhaps the most serious problem of the continued liability of the workers' compensation system, whether it can deal with the occupational disease problem.

And to take off on some of the comments John Lewis made and Dick Schubert made before lunch, it is not self-evident to me that the proper way to deal with the occupational disease problem is to toy with and play around within the workers' compensation program. We may need

to take a pretty bold step here and face the question of whether or not diseases ought to be taken out of the program, or at least certain kinds of diseases.

Frankly, there is nothing terribly innovative about this. I know the American Health Association made a proposal that heart diseases as a class ought to be taken out of workers' compensation, and ought to be made compensable under another program. I suppose that is a very good disease to start with, if you are going to pull them out of the compensation system, because the causality problems are so complicated there.

If you were, let's say you were to pull heart disease out. That is the first disease we will pull out, and we are going to set up a program at a State level or Federal program. You might then have to rethink a lot of the basic questions that are built into the workers' compensation program.

If the matter of heart disease is compensable regardless of the cause of the disease, should the benefit levels be the same as they are under workers' compensation? The benefit recommendations I have seen are rather generous. It is not clear that you can justify the same level of generosity if you are talking about a program that is paying regardless of the employer's responsibility. You may want to have a scaled-back level of benefits for a general heart disease program.

Another question which needs to be considered is should employers pay the costs of that program. Workers' compensation, in a nominal sense, and at least some of the economists had some real questions about who really bears the cost of workers' compensation, whether it is the employer or not—and if you go to a more general system dealing with heart diseases, there is no reason it has to be solely employer financed.

After all, social security is financed by both employer and employee. Many health insurance plans are jointly financed. We might want to go to a heart program which is financed by both employer and employee and indeed public revenue.

So, I must say I was kind of holding back these comments because I am moderator of this section—

Ms. ROBINSON. I don't think we can hold them back if the absence of them stifles our moving ahead on these issues—we will come back to it.

Dr. BURTON. I think you forced my hand. The way you put the question really precipitates the question of whether the definition the National Commission made a viable one?

Ms. ROBINSON. That is the question we have before us.

Dr. BURTON. I think it is a viable definition given the kinds of evidence that seem to be emerging from the medical side about prevalence of occupationally work related disease. I am not sure it is when we get up to 5 years.

Chairman BUNN. Dr. Conley?

Dr. CONLEY. You raised the question: What does workers compensation seek to accomplish in the area of occupational disease? To some extent I think that can be determined practically or realistically. Can, or in what condition can we relate the disease to employment exposure.

In the paper you raised the issue very strongly that guidelines are needed, very clear-cut guidelines, that would reduce litigation and presumably make payment of benefits much more promptly than occurs under the present system.

When you talk about guidelines, it seems to me what we are really talking about is exposure.

Length of exposure, level of exposure, and it seems the probability the disease will occur given that exposure. And on this particular question I haven't noticed any great consensus between your position for the guideline and the medical profession where we keep hearing this information isn't available. That is why I want to pose this question: are there a significant number of conditions we can generate a fairly clear possibility relating the exposure to the existence of the disease?

The second question I have is really directed to you, John, because we were talking first of all about certain types of diseases where a relationship between the disease and the exposure is clear cut, for which we can rely on the guidelines. Then you talk about a second class of diseases where the relationship is not clear cut, or the disease was relatively few, in which case we could rely on the litigation process, and we get to court, and there will be some magic knowledge that there is a relationship between exposure and the probability of disease, or there isn't. If we can't state it here, what is it in the litigation process that would make such information come out of nowhere?

Mr. Lewis. First I want to pick up on a word you used. I think it is important. When doctors are considering guidelines where there can be a probability. In most compensation cases when you talk of the burden of proof, we are not talking about certainty, we are talking about reasonable medical probability. That is the question you have to answer: is it a reasonable medical probability there is a causal connection?

It seems to me that lessens the burden on the medical profession and the claimant.

If in a situation such as some of the figures you talk about in the lead poisoning problem, that if you have a kidney disease, that 70 percent of them are going to be caused by exposure to lead. Somebody who is exposed to lead and there is no clinical evidence one way or the other, the probability is it was the result of exposure on the job.

I think that system if properly administered will lessen the difficulty of providing guidelines and lessen the difficulty of proving up a case in terms of the litigation process itself.

What I mean to say is that there are instances in which there is little medical agreement, or not enough cases to develop guidelines. What you have to do is one of two things: either develop presumptions they are all compensable, that you virtually decide by presumption how the case will be decided. You can do that. I don't think it is a satisfactory method.

Or you can go into the litigation process. The present litigation process in fact is not workable unless we do what has been talked about before, and that is give the claimant, as well as the employer access to—and the adjudicator, perhaps the most important individual—access to the best medical information that is presently available. We know there are limits on the medical information in many cases, but that doesn't mean we have to sit back and not do anything.

That is one of the things judges are trying to do, to make decisions on the best information available. That is all I ask the litigation process do. Give the adjudicator the best available, whether it is available in that particular city or State or you have to go out of the State

and go to outside sources for enough information to resolve it. You have to do it that way. That is the only way the litigation process can work.

Chairman BUNN. Before we go further, we will adjourn for the coffee break and will come back for further discussions.

[Whereupon the coffee break was taken.]

Chairman BUNN. We will get started. For the first comment I would like to call on Dr. Halpern.

Dr. HALPERN. I have asked for just a couple of minutes to make one statement. I think it would help clear the air. Although it is not directly on the point, it is on the issue June addressed. That is some of the comments made about the physicians and the physician's role. I think there is a very obvious point that should be made. I don't think it is the responsibility of the physicians themselves to be able to provide definitive information concerning the cause and etiology of occupational disease. I don't think they are the group. I think the group that is responsible is a group that could be variously labeled as medical researchers, including subdivisions but primarily biochemists. That group isn't represented here at all. They are the group that is primarily responsible for doing research, and these are the people that work for the pharmaceutical industry. Those are the people I think who should be presenting testimony in court and in litigation as well as physicians. So, I don't think in actual practice the physicians are the people with primary responsibility for many of the instances brought up. John is shaking his head, I guess he agrees with me.

Chairman BUNN. Dr. Barth?

Dr. BARTH. This is really a very remarkable conference, for a variety of reasons, not the least of which the group around the table come from different backgrounds. We have lawyers, doctors, insurance executives, union representatives, people from management. We have representatives from State agencies, Government officials, and it is difficult to imagine how a conference with persons with so many different backgrounds can be kept under control. It seems to be contained for a while.

But I think, this afternoon we have tended to go off in several different directions. Let me try and indicate why we have done that.

On the one hand we start going after the job of defining occupational diseases. We keep being brought back to Earth by our memory of what the physicians talked about this morning and yesterday, namely the very difficult problem of diseases with complex etiology. I think the issue really could be clarified if we keep clear in our own mind and separate in the discussion several different groups of diseases and how they relate in the compensation system.

I think that one set of diseases, set of disablements, are those related to situations where the etiology is unknown, where it is complicated, unknown, where it cannot be made.

On the other hand we have diseases where the etiology is not at all confusing, where it is not at all difficult to establish.

I think when we talk about defining occupational diseases perhaps it would be well advised to limit ourselves to an area where the etiology is not as complex and can be defined. In the area where the etiology is unknown and complex we have two sets of situations:

One where the disease itself may have a very short latency period, within a month or a year. Then we have those confounded cases where the latency period may range up to 40 years or longer. Some periods in excess of 40 years. The question Dick Schubert raised and we have discussed is the question, Can the compensation system in 1976 accommodate those other problems of occupational disease? It seems to me that the answer to that question really ought to be the answer to several questions. Can it accommodate itself to the problems of disease where the etiology is not a particularly great pitfall? Can it house within it those diseases that have an unknown etiology, particularly in cases where the latency period is very long?

Now, I think one of the things we are skirting here is something raised by Dr. Enterline this morning and again I pat Nancy Snyder and Mark Solomons on the back for putting on very clear in their paper the matter of ignorance. We are living with ignorance as to the cause of diseases, scope of diseases, whatever. Compensation administrators have to make a judgment on the basis of the best information available. They don't have all the information that is necessary, partly because medical files don't have that information either. They may have it next year or in 20 years. We don't know.

In the absence of that people like Ben Novicoff have to make judgments whether that case of lung cancer is one that would be the basis of proper relief or otherwise.

Dr. Enterline suggested this morning also in certain cases we can move toward establishing probabilities of what the extent of risk is. What Snyder and Solomons did in their paper was to suggest very clearly Congress intentionally or otherwise set out to change those probabilities and, in fact, opted for essentially a very large change in the system. We cannot be certain when we compensate a person who happens to be disabled that it was because of contact with dust in the mines. Do we have a system then that is so restrictive we make sure that guy that did not deserve to be compensated was not, but in so doing also then eliminate compensation in those cases, in some cases where individuals surely deserved to be.

The Congress in the Coal Mine Health and Safety Act, then in the amendments, opted for a very different kind of approach rather than move in that direction. To make certain that we compensate all workers in the mines or from the mines that suffered disablement from pneumoconiosis. And possibly in having moved in that direction we will err on the side of compensating several others or some few extras who clearly may not deserve it.

That is a matter of conscious choice. That is a direction Congress seemed to move in and they made that explicit and Synder and Solomons point that out in their papers.

I think that is what the issue is when we deal with problems of disease of difficulty or unknown etiology and also those diseases that have a long-latency period. That is to say, is it desirable and is it an appropriate time for us to change the rules of this game such that where there is uncertainty, where there are unknowns, where there is ignorance, we are on the side of compensating most everyone who would have a job-related illness or disease, or is a fatality victim, their survivors, and at the same time overcompensate by compensating those whose cases don't arise from that? Or do we stay with the system as it

appears to be, a system wherein we are making certain no one is compensated who doesn't deserve to be compensated, but at the same time making the other sort of errors of not compensating some that deserve to be compensated?

Now on the matter of the diseases where there isn't difficulty, where there are no difficult etiology questions, I think Mr. Mazzocchi and Sheldon Samuels pointed out there are still problems of workers being unable to break into the system that have not gotten into the system because of a variety of reasons.

Here I think the enemy is clearly one of ignorance. Here I think the solutions tend to be simpler. I don't think they tend to be as politically difficult. You with massive amounts of information and information dissemination, more cooperation between labor and management—that does sound a bit pie in the skyish, I appreciate it.

But, where we begin to inform workers of what their rights are and what their risks are, and I think if we keep these kinds of disease questions separate, we can make more progress.

Chairman BUNN. We will go to the audience after one more comment from Dick Schubert.

Mr. SCHUBERT. I found Peter's evaluation to be very helpful and maybe, Howard, it is a way to move toward some kind of consensus subsequently in our session—if in fact most of the panel participants agree with his breakdown.

I would ask, if I could, one question. It is on the presumptions approach. In order to assure totality of coverage, what definitional changes do you perceive are necessary to accommodate coverage where the etiology as you suggest is known or relatively unambiguous, or do you think the currently accepted definitions are adequate for that category of case, where the etiology is known and relatively unambiguous?

Dr. BARTH. I will begin by copping out and saying there are people around the table better equipped to answer that than I. I think the answer is yes and no.

Many of the laws are adequate. Many of the statutes. Many of the interpretations of the statutes as I read them are adequate presently.

There are some problems and I would simply say I agree entirely with the warnings and with the roadblocks that have been suggested. They exist, they are real, and they are stumbling blocks, but they are by no means insurmountable. They can be changed or remedied.

Chairman BUNN. Now we will go to the audience.

Mr. ANDERSON. On the point of complex and simple occupational diseases, I think it is a very good point. We, the point I would add is the complex cases you can have 1,000 gradations of risk. I may add one in a thousandth part to my risk by working across the street from a high chimney. I may add 50 percent to my risk working with asbestos. But you have to decide separately the questions of causation and the questions of compensability.

Causation is up to the biochemist to say 1 day's dosage at one thousand parts per million will cause cancer in 10 percent of the rats or 10 percent of humans. And I hope we don't have to try it on humans.

The question of compensability comes back to Mr. Burton's point of do you wish to compensate cancer in people who have the slightest connection with asbestos and not compensate cancer in people who

work in an office who may well have had asbestos coming in through the vents, but will not know about. And I don't think it would have caused cancer in any event, but it would have added one part per million to their risk of catching, contracting cancer.

And that equity between groups can perhaps only be solved by a national health program for 100 percent of the population or a statewide sickness disability program for the working fraction of the population, but sickness compensated without regard to occupation or non-occupation causations.

Chairman BUNN. Mr. Brooks?

Mr. BROOKS. It has been said as knowledge expands more diseases will be traced to the workplace. What we are talking about is liability for those diseases which are traced to the workplace. We are talking about a person who is to some degree medically ill.

Now, we have a lot of means in industry in relation to that. In some industries there is a group insurance, and if an employee is eligible for workers' compensation, or if he is not eligible for workers' compensation the group insurance, as Mr. Guy mentioned a little bit ago, is a very real thing in some industries.

But, we have a concept here we are talking about as though we have a stable workplace. More than 50 percent in any industrial plant is engaged in service work—maintenance people, messengers, crane operators, forklift truck operators, who have an augmented multiple exposure due to the fact they move all over the plant.

I also heard job title classifications of exposure. They are not yet so uniform we can talk in those terms. I think also of construction workers and truck drivers and people who do not have a stable home base.

The employee as such, whose illness we are concerned with, is an ill person for some reason or another. Where did he get it? From the workplace or from some other source.

Then we get to the question of degree. It is solely degree. If the illness is inflicted to some extent or some possible extent by the workplace exposure, should that be borne then by a program called workers' compensation, or should that, or some degree of that be borne by some different program?

I don't think we should rush to legislate in these areas because management has done a very decent job in some of these areas, admittedly at the bargaining table, and many managements that don't have union have done a very fine job.

And there is sickness and illness relief in many companies. There is dread disease insurance in many companies, and dread disease could be utilized in the heart attack problem you were talking about earlier. There is sick leave, extended sick leave. There is early retirement for physical disability. All of these mechanisms have gone into the question of the protection of the worker.

I think what we are trying to do here is to reach a problem, and we have got to recognize the job belongs to the community. It does not belong to the employer.

The job is a social device of the community and when the community decides to use the job, whether it be minimum wage, wage and hour, child labor, female labor, the committee has seen fit to use the

job. The question is, are we at the point where the community sees fit to use the job for the purposes we are discussing here now?

It was said early this morning by Dr. Howe in one magnificent sentence: We are trying to put illnesses into an essentially physical injury system.

All the things we are discussing here now, the undecisiveness, do not exist when a man falls off of a platform, or when a man gets burned, or when he steps into a greasy spot and falls. It is a then and there, now, measurable thing. There is no question of the contribution of sex, ethnic origin or age. He falls, if he falls off a platform. We have been able to cope with that for years.

Let's go back to what we said yesterday about the Bureau of Labor Statistics. We have had a first notice of injury and signs in plants since 1913: "Notify your foreman of the slightest injury so he may make a record of it." That is why we don't have causal information at BLS. How can I notify my employer that I breathed some coal dust today and tomorrow I breathed some welding fumes. And the next day I breathed something else. We haven't got the mechanisms to do that yet, and I don't believe that we at this point—I believe it's in jeopardy whether it's profitable to try and put this main problem—the more diseases that take place in the workplace, the more liabilities are traced to the workplace. I don't believe it is profitable at all.

I reach this conclusion because I have the splendid opportunity of sitting back here and listening. I am a spectator sportsman. I don't believe it is profitable to try to analyze and make the proverbial bed out of this, to twist and squirm. Let's face a new issue. Science has given us a new problem that has outrun our forum.

And I congratulate Commissioner Bunn for bringing us here and I am happy to have been a part of it.

Chairman BUNN. We are going to have to conclude this part of the program. Many of you in the audience may not have had a chance to participate. But, the next section which deals with administrative aspects of handling occupational diseases, as was indicated by Mr. Lewis earlier, necessarily overlaps with his section on the legal aspects.

So, I think some of your questions which may have arisen may be presented at the end of this section. But, in the interest of time and in order to stay on our schedule, we will have to move on to the presentation of the paper Mr. Noblin would have presented had he been here, which will be presented instead by Mr. Lewis and responded to subsequently by Mr. Johnson.

Mr. LEWIS. I am not an administrator in the classical sense. I do not deal with the processing of claims on a day-to-day basis, and as a result I am certainly not as sensitive to the issues and problems that would be administrator's such as Mr. Noblin. I do, however, work somewhat closely with at least one State administrative agency. And I indicated previously I have a substantial interest in the administrative end of workers' compensation. And also I think I ought to respond before I start this, so everyone does not feel a sense of bias on my part, that in my paper I certainly did not intend to imply that the overwhelming majority of State administrative personnel were corrupt, incompetent, or anything of that sort. First of all I would not make that statement before I finish my survey to the Task Force, and sec-

only to the surprise of some, the initial responses I have been getting to a part of the survey from the users of compensation programs in the various States indicates that such is not the case—that in only a few jurisdictions are there substantial complaints by users as to the adequacy and intellectual honesty of the administrative personnel.

I do hear comments at times that they are too damned liberal. That is tempered with the statement we have learned to live with that. And other than that there is surprising degree of unanimity in most jurisdictions that agency personnel are doing a pretty good job within the limitations of the statutory system.

Again, rather than reading the paper, I will, as Howard requested and indicated, attempt to summarize the important portions of it and in doing so I am sure some of my own comments will slip in one way or another. I am hopeful my comments can be separated from the ideas of Mr. Noblin, although we have discussed this paper previously and our ideas previously, and you will note there is some degree of agreement between his paper and mine, and among the opinions that have been expressed here over the past few days.

As indicated in the paper the administrative aspects of workers' compensation, and specifically with regard to occupational disease, is not a product strictly of statutory processes. The informal unwritten procedures that Commissioner Noblin refers to as the laws of the halls, in reality can have a significant impact on the administration within a State. You will find if you investigate administrations throughout the country, that despite the similarity in statutory authority and statutory provisions, that in practice there are wide differences in the ways that things are done in various States.

In the classical sense administration involves a large number of responsibilities; that is, providing the users of the system—employers, employees, insurance carriers—with requisite notice of their acts, of their provisions, of their right to bring claims, of their responsibilities. In addition, they must provide, the administration must provide, the user of the system with specific forms and other information which must be used in coming into the system.

Next the agency, administrative agency, has to provide information to employers that is necessary for the employer to properly exercise, not only its authority, but obligation under the compensation system.

Next I would like to emphasize this point in the paper that the responsibility exists of obtaining and evaluating medical determinations. And, as a personal comment I would emphasize the word "obtaining." As we discussed before, the agency does in most cases have a statutory responsibility and authority to obtain the necessary medical and related information for the adjudication and other handling of compensation claims. In some States this is done routinely. In many States it is not. One of the things I am advocating is a little more active role by the agency in obtaining independent medical information as well as technical information.

With regard to claims that are not contested, the agency has the responsibility of seeing to it that there is a review procedure so that it can be determined whether benefits are being paid properly in such cases. The agency must adjudicate controverted claims and provide a review mechanism.

In order to determine how the various State agencies operated in this area, a telephone survey was conducted by task force members in conjunction with Commissioner Noblin to try to get some idea in a rather informal manner of how State agencies function with regard to occupational disease administration.

One of the first questions asked and one of the major questions was how are medical determinations of the causal relationship made for occupational disease cases? There are perhaps three major methods of resolving these medical determinations.

First, is sort of the old method in which each side comes in and presents its medical witnesses and the judge then, judge or deputy, whatever the term may be, then decides the case on the evidence presented.

Second, there are in a number of States medical panels used not only for occupational disease claims, but for other contested medical questions and the medical aspects of the claim are referred to the board or panel for determination.

This can be a binding determination or it may be merely for the assistance of the factfinder who then still has the right to make the ultimate determination.

The third method found by the telephone survey was an advisory commission or panel for a specific disease such as silicosis or asbestosis. I suspect in those cases the individuals on those panels were more closely related to the disease rather than being general practitioners or physicians with broad experience in compensation matters in general.

One would hope these individuals would be experts in the field under consideration.

And finally, as was pointed out in the paper, there were various blends of these methods.

It is difficult to make any determination as to which work best. I suspect the accurate answer is it depends on a number of variables. The kinds of States; that is, the degree of industrialization, the degree of organization, the availability of experts for a panel, the willingness of factfinders to use independent medical testimony even without panels. All of these factors will determine whether or not any one of these methods may work well in a State.

As I indicated in my paper, the value of these panels and these methods really depends on the expertise of the individuals who are selected to serve, their willingness to obtain additional input when they do not have the necessary expertise, and the ability and willingness of the administrative personnel to make use of their findings when the determinations are made.

The next major question asked in the survey was: "Does your agency break out the number of occupational disease claims filed, as distinguished from injury claims?"

As one might expect and is indicated in the paper, there was no uniformity in this regard. And perhaps this is unfortunate, definitely it is unfortunate. One of the things we talked about is the lack of statistical information. One of the major sources of information should or could be the State administrative agencies. I believe there are substantial efforts being made to break out this information to provide more detailed information and to make it available on a uniform and

routine basis, so that despite the limitations we face of people getting into the system, at least once they do the case history is available, and whatever information is available can be recorded by the State agency and made available to those who are in need of that information.

There are a few States that do provide this kind of breakdown, but I think they are rather few or limited in number and we do need substantial improvements in that area.

The next question: "Are you aware of any work related diseases in your State which are compensable under your workers' compensation law?"

As indicated, many of the States reported, no, there are none. But once again it was apparent we got into a terminology problem, because of a lack of communication, perhaps, through using the term "work related" as opposed to the various other definitions that we discussed today.

It was pointed out, Commissioner Noblin pointed out in his paper, that there are problems with regard to some of the definitions. He uses the term "restrictive broad definitions." They are, I believe, the ones I referred to today that require peculiarity, unusual exposure, things of that nature. And I find it personally most interesting that in States in which there are difficulties in obtaining complete coverage of occupationally related diseases, the administrators in some instances noted, not recommended, successful direct action litigation can effectively dissuade overly restrictive definitions that remove the claim from your jurisdiction and limit the liability of the State's workers' compensation law.

It is here the tort liability with its unlimited damage award can be a very effective club in convincing employer groups who have some influence as to statutory enactment, that perhaps you are better off with broad coverage of occupational diseases compared to a more restrictive interpretation of the term occupational disease.

The next question, a rather general one, was: "If you had personal authority to change your present State law, what changes would you make to improve the present administration of occupational disease claims?"

It is interesting to me that of the five recommendations that were mentioned, most often, at least four of them, were recommendations that we have talked about indepth here over the past 2 days. That is, broadening or improving definitions; developing better medical determination; developing reasonable presumptions; and repealing restrictive statutes of limitation.

The fifth area, that of repealing waiver provisions in occupation disease statutes, has not been mentioned previously. For those of you not familiar with them, they are provisions in laws which permit individual employees to waive their right to benefits for certain diseases, so as allegedly to enable them to obtain employment, even though the risk exists in their individual case that they will develop the disease because of past exposure.

I think it is generally accepted in compensation fields the proper way to deal with these hazards is through second injury funds and not waivers.

The remaining aspects of Mr. Noblin's paper to a great extent are a number of comments on things that were found in the survey. Things that somewhat were not surprising: dermatitis for example, is the disease most frequently compensated. And it also appears to be the least costly type of disease.

We have talked about our guesses or our ideas as to why this is the case, and I think we had pretty well determined that there are very, very important reasons for the lack of compensation for many diseases which it is now pretty well accepted to be occupationally related.

There also is a comment as to making employees, individual employee aware of their rights and their entitlement to benefits for occupational disease.

And I think that one comment should be emphasized, that direct employee education seems most effective when provided through union leadership, employee representatives, or through local medical practitioners. I think one assumption that might be made is that most employees tend to distrust information that they obtain from other sources, such as employers and employer groups and insurance companies. It is unfortunate in some instances, because there are legitimate efforts to provide adequate and helpful information. But, I am afraid there are also instances where the information provided is somewhat less than reliable or is nonexistent.

Occupational diseases take longer and cost more to process than normal injury cases. I think we are all aware of that on the basis of the discussion for the medical reasons, the case history reasons, that have been thoroughly discussed.

Also few States have conclusive presumptions dealing with occupational disease cases. Most of these presumptions are rebuttable, and there is always a question in my mind as to what it takes as a practical matter to rebut a rebuttable presumption.

It is impossible to define legally, and I suspect it depends on the individual judge who happens to be involved in the case.

The conclusions drawn as a result of this survey were as follows:

First, occupational disease claims have in the past been a small percentage of the claims in the overall compensation picture, but appear to be emerging as a significant problem in the area of administration.

I think this is a significant statement in that at the present time it appears the numbers of claims have not dramatically increased or at least all preliminary findings have indicated that.

What appears to exist is a growing awareness on the part of those dealing with the compensation system that perhaps there is something outside the door that is going to cause a rather significant increase or has very recently caused a significant increase.

Second, that a significant number of cases may not be getting into the system due to lack of recognition. That is a major problem we have talked about here previously, and so far, I think, have been unable to resolve. I suspect we are going to have to spend considerable time coming up with reasonable methods, viable methods for bringing people into the system if we stick with the system we have.

The third conclusion, that refinement in the workers' compensation law in the area of occupational disease is needed in many States. Once

again in terms of definition, better ways for determining medical causation, and broader statutes of limitations.

Fourth, and perhaps obvious, the potential cost to both employers and employees of occupational disease is great.

Perhaps it is a good time to emphasize that regardless of all our talk about how to deal with occupational disease claims, when they arise, unless we are able to cope better with the causative agents and prevent many of the problems, the system may very well be inundated, whatever system we use and no matter what mechanism we may attempt to use.

And finally, next to finally, is the conclusion that the effectiveness of the entire administrative process is the need for competent people to meet the responsibility of administering various workers' compensation acts. As has been discussed and as I indicated before, it takes some of the pressure off the State agencies' administrators to say that when we talk about administration and a need for competent people, we are talking about more than State employees. We are talking about lawyers and members of the medical profession and other technical people who are involved in compensation cases.

And finally, workers' compensation administrators, in the view of all those here and those represented here, the emergence of occupational disease is a uniquely complex area of the workers' compensation system, and administrators have already been scrutinizing their authority and responsibility and expertise to determine whether or not they are prepared or can be prepared to adequately meet this challenge. Although administrators certainly won't guarantee you or the public that they can effectively meet this challenge, they can guarantee you and the public no one can handle this problem alone.

Chairman BUNN. Mr. Johnson?

Mr. JOHNSON. There really is nothing in Mr. Noblin's paper or in John Lewis' presentation with which I would take real issue. Thus, my remarks of necessity are going to be supplemental and probably to some extent rather basic.

Mr. Noblin directed his attention really primarily to governmental administration with some suggestions for bringing individuals into the system and taking them through the system.

Now, in discussing administration of workers' compensation in this sense, it is somewhat difficult to differentiate between occupational disease and normal injuries. Occupational disease might require more attention. But, the fact remains, once the physical injury of occupational disease gets into the system, it generally follows down pretty closely the same pathway. One may be more complicated than the other.

Some of what I refer to as the basic remarks, which I trust will be appropriate, are:

The management administration for workers' compensation of necessity have to vary by States. Not every State can afford or is it required that they maintain the same type of a body. Some States should have administrative boards which obviously include medical bureaus, permanent disability rating bureaus, and separate rehabilitation units or departments. Other States of necessity are going to handle their affairs in different manners. There are, however, certain

basic requirements that are fundamental. There are fundamental tasks to be performed by the Government, and Mr. Noblin has set these out and I won't enumerate them here. I agree with what he said.

I think we should always remember good administration is not necessarily achieved by a battery of mandated reports. Although some reports are absolutely essential to an efficient functioning of the system.

What we also must remember is that what is required today is vastly different from what was required yesterday. As the position of "Let the buyer beware," a phrase I heard many times in law school, has been replaced by consumer protection acts, action lines, and other protective mechanisms.

So has and is a change taken place in workers' compensation.

The term, "Right to know", has been used in the last 2 days and properly so. But, a great amount of attention is being directed today, although albeit kind of late, to informing workers about their rights are before an injury takes place.

And I guess it is somewhat unfortunate some of that had to take place by legislation. Nevertheless, there is such legislative acts in existence. But, fortunately, there also is a great deal of voluntary work taking place in this area.

Also, once an injury has occurred, there are requirements today that the worker be informed of their basic rights.

This is being done by brochures, pamphlets, by mandated furnishing of certain information, and you can add now the establishment of toll-free telephone lines, and many others.

Now, maybe all this is not enough. But, some movement is taking place, and we are not just in a dormant, stagnant position.

Now, the type of activity that is occurring in the areas should be encouraged by governmental administration, and I am sure it is in many jurisdictions. One conclusion is just outstandingly clear, and that is our States are either going to have good efficient governmental administration or the administration of the system is going to be taken over by the legal profession. There is certainly great evidence of that today in far too many States.

And as mentioned earlier today that is an extremely costly process and really benefits no one other than the attorneys, and I guess some doctors.

Occupational disease claims do present a more challenging administrative problem than do industrial injury claims that are clear-cut. I guess this suggests governmental administrators should take a more active role in making certain that such claims do get into the system and they are processed effectively through the system.

The use of medical advisors or any medical examiner has been referred to, and I would like to add my weight to the fact that it could be utilized to assist in overcoming disputes without requiring that all controversies start and end with the judicial process.

Mr. Noblin in his report referred to liberal construction. I don't think there is any major quarrel with liberal construction of the law, but the problem rests today, at least in the view of some people who have a biased viewpoint, a liberal construction of facts, which also includes medical opinion.

Now, the question Mr. Noblin asked, to which Mr. Lewis referred, was: Does your company break out the number of O.D. cases, occupational disease cases filed? And you could not give an answer. That answer obviously would require a definition of occupational disease, and for evaluation purposes, its application would have to be uniform.

Even when statistical information is available it must be used with extreme care and I probably should have said something about this yesterday rather than today, but Dr. Ashford used the data of 27,000 occupational disease claims in California in his report. I have no quarrel with that figure, but I would like to point out what occupational disease claims in California are. They usually involve 1 to 10 or more employers. Well now, if those employers all reported that same disease, you will get an entirely different view or analysis of the statistics.

On the other hand and counterbalancing that, since so many employers are generally involved, the reports of the employers are not made because the claim enters the system through the judicial process.

Now I don't know that those are balancing or not, but the point I am trying to make is, unless you know how statistics are put together, you have to use them with extreme care.

In closing I would like to see if I understood Judge Novicoff right—I am sure I did. It isn't the basic statutory law that really is important, albeit it is extremely important, it is only as good as the administration that supervises it.

Chairman BUNN. Any comments? [Pause.] Anybody like to pick up the comments that may have been left off from the last session? [Pause.]

Dr. Hook?

Dr. HOOK. I am with the Kaiser Permanente medical care program in northern California. This is a large prepaid health plan which provides total care for prepaid fees. We are large. We have a million and a quarter members located in 14 medical care facilities, which are hospitals and clinics, and an office building, and we have 1,200 full-time doctors.

My remarks are primarily addressed to Mr. Bunn and members of the task force and relate to a matter Judge Novicoff mentioned in passing, the compromise and release of occupational disease cases.

I am in agreement with the definition of occupational disease as given by Clarence Johnson. I grew up on that definition. And I don't think I would have trouble living with the definition by Judge Novicoff.

Basically though, I do feel our cases in California, the 10 percent Clarence Johnson mentioned, is probably low because of a lack of recognition. And I base that on my experience with our full-time physicians. We have great sources of information which have never been tapped, so far as our medical care program. We are very much concerned with this because we provide total medical care in a prepayment plan. We have approximately 2,500 pending cases waiting to be decided at the workers' compensation board at the present time, amounting to approximately \$3 million. We file at least 125 new liens each week. These claims are contested.

In addition to that, about 20 percent—we haven't recognized—about 20 percent have been recognized and paid for.

Now, in these lien claims that are settled, we have a very high percent. In California, 2 years ago, there were approximately 90,000 filed, of which 52 percent were determined by compromise and release. This is a large number of cases. I have no objection to it, because I think it would be utterly impossible to operate otherwise. We have no objection to compromise and release in the cases of nuisance settlements. However, when there is a case where there is a conceivable difference as to whether it is or is not compensable, where we have two sets of lawyers on each side, with two sets of medical witnesses, and this is a decision matter for a judge, we feel a high percent of our cases, higher than 52 percent, almost close to 60 or 65 percent, are decided by compromise and release.

In compromise and release there is no exclusion for medical care. In other words, when it is compromised and released, the case is closed. It is in the interests of everybody to close the case. We have no objection to that. We do think you should exclude from the compromise and release medical care except in those cases which are purely nuisance.

I contend many of our cases are occupational diseases. In fact, a large percent of them. I think in every case you can say there is a reasonable doubt as to whether it is AOE or COE. It is a matter for the trier of facts to decide. If it is settled by compromise and release, no decision is ever made and medical care is then provided. So, I think in some ways what I heard today—and I appreciate this meeting very much—all the things that have been said, there is one thing I think, and that is some of the occupational disease cases are somewhat of a myth when it comes to providing medical care for lifetime benefits. Because, if your experience in your State is as it is in northern California, a great many will be compromised and released.

I would make this suggestion or recommendation, what you will, to the task force. Something should be said about excluding medical care from compromise and release so a man who has a compensable disease such as asbestosis, mesothelioma, heart disease, will not be precluded from medical benefits after the decision is made. I think he loses his rights and that it is unfair to the worker, and the worker is the man we are interested in.

Chairman BUNN. Mr. McMahan?

MR. McMAHAN. I would like to attempt to respond to June Robinson's plea that we come to some sort of, at least definition of what the problem is, if not a consensus.

I mentioned yesterday I was concerned about the sense in which we were using the term occupational disease. As I listen today I am now convinced we are using it in two entirely different senses. And we will never get anywhere unless we separate the senses.

So, just for discussion's sake, I would say, if I were making a recommendation as the task force on what we ought to try, on what the Government, or society ought to try and accomplish, there would be two very different things.

First, so far as occupational disease is concerned in a medical sense, there is a very definite need to identify the factual inquiry, scientific inquiry. A very definite need to identify what kinds of diseases are caused in any sense, perhaps it is better to say the incidence, prevalence or severity is magnified by work. So, if you want a medical

definition of occupational disease for the purposes of correcting it, alleviating it, eradicating it, it would have to be that it is any disease where work magnifies the incidence, prevalence or severity.

That I think is an entirely separate function from making the social policy definition or decision of what kinds of partial or total disability to work ought to be compensable.

Traditionally these two things have coincided, but they don't necessarily do so. In fact, I have a very great doubt that they ought to coincide.

It is not necessary to use the workers' compensation system, or decisions concerning compensability of partial or total disability to work due to disease, in connection with causation or determination of the causal connection between disease and occupation. We have done that because we wanted to use the compensation system to either fix, distribute economic costs to an employee, either on the basis of considerations of fairness or on the basis of considerations of responsibility or guilt, or on the basis of prevention.

But, prevention of occupational disease, once it is identified, in the sense I described, a medical sense, to be achieved through a completely separate legal system, it need not be done on the basis of inducement to alleviate hazards, to eliminate hazards, because you want to cut compensation costs. You can simply say it is wrong to expose people to hazards.

Such judgment on what is or is not compensable is purely one of economic policy. It does not have to be connected at all to a disease. You can say, if you want, any disease a worker develops, contracts, can be compensable. You can say that the worker and the company, his employer, should cover themselves, protect themselves, against disease through a cooperative insurance plan that has nothing to do with workers' compensation.

The compensation system can achieve many results. It can be, as the gentleman that spoke in the audience questioned earlier, that the job does belong to society and the job can be burdened with all sorts of social mechanisms in the pursuance of all sorts of social objectives, but we do not need to be bound by this connection between occupational disease in the medical sense and social costs, economic costs, of inability to work.

All through this conference we talked about occupational disease, and everyone seems to have overlooked the fact we are actually talking about total or partial disability due to what occupational disease is in the traditional sense.

Many of the toughest questions that have arisen, such as long, long latency periods probably are irrelevant here if a person develops this latent disease after he is out of the work force because that is not the concern of the compensation system.

Chairman BUNN. Madam Reporter, may we go off the record a moment.

[Whereupon a conference was had off the record and the proceedings recessed at 4:50 p.m. to reconvene at 8:30 a.m., Thursday, February 12, 1976.]

PROCEEDINGS OF THE INTERDEPARTMENTAL WORKERS' COMPENSATION TASK FORCE CONFERENCE ON OCCUPATIONAL DISEASES AND WORKERS' COMPENSATION, 1976

THURSDAY, FEBRUARY 12, 1976

U.S. SENATE,
PRESIDENTIAL TASK FORCE ON OCCUPATIONAL DISEASES
AND WORKERS' COMPENSATION,
Chicago, Ill.

The conference met, pursuant to notice, at 9 a.m., at the University of Chicago, Center for Continuing Education, 1307 East 60th Street, Chicago, Ill., J. Howard Bunn, Jr., J.D., director, presiding.

Chairman BUNN. It is important that we get started on schedule. In order that the court reporter be able to get the matters being stated into the record, until such time as we get the microphones operative, I ask you to please speak a bit above the normal tone in order that she can hear you.

As you recall, yesterday afternoon we adjourned with the idea there might be some further discussion on the matters we were into at that time. Upon reflection of the rather tight schedule we have this morning, I think we will move directly into the discussion of the proposed Federal legislation.

And, to make the first presentation in that area for the panel to consider by way of comments on the proposal from the Senate is Mr. George Sape.

[Whereupon a discussion was had off the record.]

Mr. SAPE. First of all, Howard, let me thank you for giving me the opportunity to take a little time out of your conference to talk about Federal legislation. I know this is not a legislative conference as such, and accordingly I am not going to spend a lot of time summarizing various portions of the bills pending in either the House or the Senate. Instead I will focus in on those aspects which I think are most directly relevant to the participants of this conference, namely the occupational disease areas.

Let me stress at the outset, when I came to this conference, and I am still in this role, I am here as an observer in my role with the Senate Committee on Labor and Public Welfare to try and glean as much information and get as many answers as I can to the problems we face in trying to develop an effective scheme for the Federal legislation in the workers' compensation area.

There is a recognition in the Senate and I think in the House—and there are several House staff people here, and I am not going to try and second guess what the House will or will not do—but, certainly

for the Senate side, there is a strong and definite recognition that there is a need to engage in some sort of Federal review of the entire workers' compensation system.

Now, as far as the Federal perspective, or certainly perspective of the Senate right now, on what we need to do or what is a proper approach to the question of occupational disease, I think I can honestly say we feel something must be done to develop a mechanism for uniform Federal oversight, or a uniform Federal machine to insure development of the law in an orderly fashion. I am not sure we have many more answers than that.

Part of what I would like to stress this morning in speaking about the pending bills are a couple of things probably most of you are familiar with, but I would like to restate them so my perspective on the problem is clear.

That is, one, legislation in and of itself is sort of an evolutionary process in that the bills that you see pending before the committee right now may or may not be the bills that are finally reported to the floor for Senate and House action, and those bills which finally are voted through by the Congress may or may not represent those that entered the floor.

The reason I stress this, I think—certainly my chairman has always been of the opinion—the bill on the Senate side is not cast in concrete, that we will make changes if needed, and various interrelationships of various elements of workers' compensation in the bill can be improved and do need to be improved before the final system is adopted.

There are, however, certain givens, and part of what I have heard over the last couple of days forces me to state a couple givens, which I think are certainly accurate for the Senate, and I think they are probably accurate for the House, given that their bill is very similar to ours.

First of all, I think I have to say unequivocally at this time there is certainly no intention on the Senate side to change the approach to occupational disease away from workers' compensation. I have heard several comments made over the course of the last 2 days that there may be reasons for dealing with occupational disease in some separate system, some national insurance type system that bears a variety of approaches. And I am not here to say it is right or wrong because I am not in a position to make those judgments.

But, I do know from the perspective of the committee on the Senate side, it is the view of the members of that committee that workers' compensation is the vehicle by which occupational disease should be looked at, at least right now.

There is an established system of law; there is an established mechanism in most States, or possibly in all States to a certain degree, which can deal, in our opinion, with this problem. The whole purpose of the Federal legislation is merely to establish a Federal overlay onto the existing State systems and to develop what we feel are more proper procedures—and to obviously increase the benefits in several areas.

Now, I think there are—we all acknowledge and I know the members here at the conference have acknowledged—there are basic underlying problems in the comp system in various areas, not the least of which is

occupational disease. But, there are certain aspects of the occupational disease problem which I think make it more complex from our standpoint, from the legislative standpoint, and certainly I am sure it makes it more complex from the enforcement standpoint, as John Lewis talked about yesterday.

For us, I think, one of the major problems was really highlighted, on the first day when John Burton asked Dr. Selikoff about how many diseases out of 100, or how many cases out of 100 could the medical profession identify the cause of. If I remember the answer, it was five or less—something to that effect. And this poses a real problem from the legislative standpoint because we do perceive there is a need to do something. There is a need to improve the system, and yet the traditional identification of cause, which would make writing legislation very simple, is not there. So, all we end up doing, as we do frequently in legislation, is to develop broad parameters which are designed to allow over the course of the years some method within which specifics of the law, and specifics of the profession, I guess, too, can develop.

In the occupational disease section on the Senate side, what we have really done is, I think, state the problem and set out a cast of characters who have to deal with the problem, and then provided some very general mechanism within which these characters can operate. And, I think when we are talking about the cast of characters on the occupational disease side, most of the people in this room would probably be involved at one point or another. The Department of Labor specifically has been assigned responsibility for promulgation of standards, the Department of Health, Education, and Welfare and NIOSH have been assigned specific functions and roles under the pending legislation, and the National Advisory Council on Workers' Compensation which would be established under the law has also been assigned a role.

What we, in two sections in the bill, we, I think, have stated as much as we can do legislatively, given the current state of the art.

We have set out how it would be—we have provided initially, after enactment of the law, HEW working in conjunction with NIOSH, and in conjunction with interested employer and employee groups, and obviously that includes many individuals who are experts in the field and qualified to participate in the initial review process, that HEW and NIOSH undertake a comprehensive study of the whole occupational disease problem from a workers' compensation perspective and develop a report. And, this is obviously a fairly vague way of saying, come to some conclusions. And, to submit this report—to publish the report—but submit it directly to the Department of Labor, and the Department of Labor, Secretary of Labor, on the basis of this report, in conjunction with the to be created National Advisory Commission, would then be authorized to promulgate an initial set of standards to be applied in all States as part of those States' workers' compensation law to deal with questions of occupational disease, so there would be uniform provisions, at least uniform minimum provisions in all of the States.

Where we go after that, I don't know. We perceive from our perspective that the mechanism set up in the bill should continue to function in that way for several years; that there should be followup studies if needed by HEW, and the same group of people who might

have participated in the initial study, that the National Advisory Commission would have an ongoing role to develop its own input, its own views on occupational disease, and propose to the Secretary of Labor additional standard-setting responsibility and additional standard-setting functions.

Obviously the papers that were developed for this conference and any final conclusions and overviews that might be developed by the task force and the participants, would be very helpful to the committee at this time, because of the pending legislation.

As for the timeframe on the Senate side for this legislation—we expect to initiate and complete our hearings during the first week of March, and we would expect to have action on the floor of the Senate on this legislation some time in the middle of summer, probably June. So, I know that given the kind of problems raised at this conference, and the fact that I don't think anyone is going to come up with a major breakthrough between now and June, any inputs you can provide to the Senate committee would be appreciated.

Many of the people in this room I have talked to already, and other members of the committee have talked to, on the pending legislation and the kinds of things that would be involved and changes we need to make.

I would say there is one difference and a significant difference between the House and the Senate versions of the legislation, and I think it is, as part of the discussion and comments on the occupational disease provisions of the legislation, are that the members here would want to perhaps address.

The House version of the bill does not provide any standard-setting authority in the Department of Labor or any other Federal body at this time. The House version of the legislation merely specifies there should be a study conducted on occupational disease and that on the basis of that study certain recommendations for further legislation should be made.

Now, this difference is, I think, significant in the Senate and House approach—and I am not trying to second guess the House Members, and if I do, let me know—but I know, at least in talking to Congressman Daniels and his counsel on this particular piece of legislation, they feel that they can approach workers' compensation legislation as a multistep process. In other words, it is their opinion they can afford to go this year with as much as they feel they have the ability to do and they can revisit the question later. I can say from the Senate perspective that we view that the adoption of a national workers' compensation law on the Senate side would be our one shot at this for what certainly probably would be at least a 10-year period. We would not expect to revisit workers' compensation legislation unless major problems develop any time soon after the initial passage of the law.

Therefore, I think our approach on this particular aspect of occupational disease is that we do need—we feel we do need to provide a system whereby the Federal Government can continue to insure the orderly and uniform development of occupational disease law. Accordingly, I think that at least the mechanism we have at this particular time, standard-setting authority in the Department of Labor, combined with the other safeguards we provided in the legislation,

will provide the most effective mechanism for developing occupational disease laws within the workers' compensation ambit at this time.

Chairman BUNN. Dr. Mancuso.

Dr. MANCUSO. Thank you for the privilege of responding. I should like to comment on those sections of the Senate bill No. 2018 that relate to employment related diseases. I have some suggested recommendations relative to specific matters that require consideration in the legislation designed to improve our workers' compensation system.

My first consideration is an attempt, however, at an interpretation of what appears to be a very clear statement of section 6(a) of S. 2018, which states, in fact, that the Secretary of Health, Education, and Welfare is authorized and directed to undertake a study of diseases related to employment and so forth, to make recommendations for appropriate standards for determining: (a) whether such a disease arose out of and in the course of employment; and (b) whether death or disability was due to such diseases. Such standards may include reasonable presumptions whenever appropriate and so forth, and on the basis of the study provided in section 6(a), new or additional standards should be promulgated for determining whether a disease arose out of and in the course of employment or whether death or disability was due to such disease. That is the statement of the law.

The point I am making is that there already exists a large number of severe diseases for which a definite occupational relationship exists and for which no studies are required. Some of these were identified in the Williams-Javits' bill of 1973: namely silicosis, asbestosis, berylliosis, diatomite pneumoconiosis, talcosis, shaver's disease, siderosis, and lung cancer—and I will qualify that—mesothelioma, as well as many respiratory diseases for which a miner qualified under the Coal Mine Health and Safety Act of 1969.

In the case of lung cancer certain industrial relationships have been established and with further study additional industrial causes are most likely to be discovered. This is true with different types of cancers.

So, with the exception of lung cancer, for which there are recognized multiple causes, all other diseases specified in the Williams-Javits bill of 1973 are clearly defined occupational diseases in which there is no question at all relative to the medical diagnosis, and there is no need for any particular study to establish those particular diseases as occupational entities.

Now, relative to the diseases mentioned, for example silicosis and asbestosis, the medical evidence of the disease is final proof of the specific effect of that prior occupational exposure where such medical effects occur, more than a presumption exists, that this is readily apparent, all such diseases are harmful and have demonstrated damage to body function, harmful changes to the human organism, and so forth, of a substantial nature. I see no need to require or set up additional criteria when occupational disease has already been established and exists.

Theoretically, the injurious exposure is any combination of the agent—toxic dust, fumes, and so forth—the environment—exposure, condition and duration—and the hosts—the individual. That combination produces a disease. The presence of a specific disease, a

disease already established and medically recognized, is due to a specific substance such as silicon is evidence in itself that injurious exposure has occurred. The disease means and represents that the injury has actually occurred and has been demonstrated by physical and X-ray examination.

In the case of trauma, if an injury has occurred, then there must have been a causative agent. In this sense, occupational lung disease due to dust is essentially slow trauma. If a man is hit by an automobile, the law is not concerned primarily with the intensity of the auto impact, but rather with the result; the injury that occurred. The law can set a maximum level of speed or concentration of silicon in an attempt to minimize injury, but neither a speed limit or predetermined concentration of silicon can be considered an arbitrary level below which industry is not permitted to fall.

The fact that any level of concentration combination can be injurious is not, however, an argument that no control should be instituted. The word "injurious" relative to dust, fumes and so forth, signifies the accumulative effect of the total quantity of exposure and the type of exposure that the individual is exposed to over a period of time.

There is a marked variation and susceptibility for resistance of individuals. Cases have been observed, and some persons have been exposed to small amounts of silicon who developed more disability than other persons who have been exposed to greater amounts of silicon. Further, there is increasing evidence that the onset of silicosis can be hastened by inhalation of other substances along with silicon.

The alkalinity associated with sand in the scouring preparation was reported to have caused silicosis in from 20 to 26 months—galloping silicosis—in a small group of exposed individuals. The silicon dust concentration was tremendously high. Talcosis of an unusually rapid development, 16 to 24 months, was reported also under circumstances of excessively high-talc concentration. Fluoride in the form of fluor-spar in mixture with quartz with silica has also been reported experimentally to induce more intensive fibrosis than quartz alone. Although the latter may be present in only minute amounts—1 percent in the mixture.

These comments on silicosis emphasize the importance of the medical findings. In not only presuming, but in concluding that occupational relationship—that is a relationship to prior work exposure. This applied to the previous specific occupational diseases included in the 1973 bill.

I believe the purpose for the inclusion of the 1973 bill was to help expedite and clarify the compensation procedures for the respiratory diseases, to at least remove this group of diseases from further delay and unnecessary litigation. In my opinion any workers who sustain such occupational diseases certainly are entitled to compensation without delay and unnecessary complicated legal proceedings.

Also consideration should be given for the inclusion in the final version of S. 2018 to allow for these already demonstrated specific occupational respiratory diseases to avoid any necessity to restudy these diseases. I am concerned, too, that when the diagnosis of such specific occupational respiratory diseases has been made, that certain restrictions—relative to date of filing, the date of prior exposure, or dura-

tion of exposure, or stage of disability—that such restriction not be used to deny compensation for the disease already sustained.

Silicosis is a good example. In the past—I believe it is true now—silicosis claims have been denied in certain States because no injurious exposure occurred within the last 8 years. In essence, a person may have total disability due to silicosis and be denied compensation because exposure did not occur within the 8-year period. Further, in the States, silicosis is not compensable unless there is total disability. The meaning of “total disability,” however, for all practical purposes, is near death.

The basic point is that medically there is no disagreement, rather widespread recognition, that in silicosis extensive fibrosis occurs, demonstrable by X-ray and by autopsy; that an infection may occur, that secondary infection on the heart or pulmonary, that causes the impediment of the flow of blood to the lung, can occur, and is not minimal, is not unusual; and that various stages of disability do occur. The degree of pulmonary disability which does occur will be very substantial because of the legal provision of total disability or no compensation is allowed.

Chairman BUNN. Dr. Mancuso, let me ask you if you would do this—I think I have sensed the point you are making, that it needs to be, the specific occupational diseases that are available, spelled out rather than having reestablished standards.

I, the only thing I caution, not only you, but the rest of the panelists, is we have a lot of ground to cover today. What I would like for you to do, if you wouldn't mind, would be to, as quickly as possible, summarize the other conclusions you might have about the bill, the mechanism in the bill for referral of the cases to the Advisory Committee, and so on, and any comments you might have on that.

I would appreciate it if you would, in maybe 5 more minutes, wrap up your comments, and, I say this with all due apology because I would like to hear all you have to say, but we have a very tight schedule.

Dr. MANCUSO. The question as I perceive it relative to the improvement of occupational disease is how can we reasonably determine whether illness or disease can be presumed to be work related? I believe that one major approach is to establish presumptions of work-related causations would be to include, one, the specific respiratory diseases as specified in the 1973 bill that I previously mentioned.

Two, establish presumptions relative to specific diseases, substances listed in air contaminant standards which relate to approximately 500 chemicals and agents, and when the worker in that work location divulges an illness whose symptoms are medically known and associated with that particular toxic agent.

Three, establish a reasonable presumption for chemicals and toxic agents like kepone, for example, not already in the air contaminant standards, when illness or harmful effects occur due to a particular chemical with medically recognized symptoms and findings.

Four, establish reasonable presumptions of work-related causations for those illnesses and diseases or harmful effects, when correlation analysis of work exposure and health effects indicate a pattern of similar health effects among other workers similarly exposed in the same working facility. An example is kepone.

In essence, if a group of workers working at the same place, doing similar type work are exposed to the same type of toxic agent and come down with similar symptoms and health effects, a pattern has been established; a work-related illness has been established.

In order for the compensation agencies to properly administer their responsibilities relative to the evaluation of cases that pertain to occupational disease, I do believe that Senate bill 2018 should include mandatory provisions of the following:

1. The employer must maintain and retain all medical records, accurate and complete, pertaining to employees, with proper safeguards to insure retention, completeness and so on.

2. Employers must maintain and retain a proper identification of all trade name products and chemicals used at respective facilities and toxicological data.

3. The employer must maintain and retain all accurate and complete records of environmental tests and measurement of chemical substances at that particular facility.

It is my opinion the compensation law should require these essential components necessary for the compensation agency and the physician to evaluate each case, and the environmental data and medical data are essential.

I will stop at this point.

Chairman BUNN. I know you had some other areas you would probably like to have had time to submit and, Dr. Mancuso, in pursuance of that, if you have the time and would like to do so, we would appreciate it if you would drop us a line with some comments or further specifics that you might want to elaborate further on than you have at this time.

Mr. Schubert.

Mr. SCHUBERT. Two very quick observations.

One is that I sense a kind of abdication, George, of legislative responsibility—at least as I see it—and ducking of the major issue of the causative factor and allocation of cause that we have been talking about over the last couple of days. And, I despair with my friends from the Department of Labor who are going to be given this massive piece of legislation which, in effect, is saying, you go and do the tough stuff and we will call you up for oversight hearings, and regardless of what you do, we will beat on you.

And my perception over the last 5 or 6 years is that is what Congress has increasingly done. They have refused to bite the controversial bullet and passed it on to administrators, and many administrators are faced with just an impossible situation.

The second thing is obviously there is a significant constitutional question about the Federal Government legislating, in effect, State standards and adding those standards to the body of State law.

I don't know whether you want to comment about this or not, George, but I think it is something that will bear a great deal of proving.

Chairman BUNN. Mr. Lewis.

Mr. LEWIS. Mr. Sape, as you mentioned, a number of us have indicated concerns as to whether or not the compensation system is capable of handling the large numbers of occupational diseases that we either assumed are going to be presented to the system or fear will be presented to the system. And that as a result a move toward total—a move

toward placing the total burden of occupationally related diseases on the present compensation system, using the same mechanism, the same tests, might very well over burden the system financially and mechanically to such and extent that the aspects of workers' compensation which now either works well or is capable of working well will be totally inundated.

Has the Senate made any determinations, or assumptions, or considerations of the impact of the definition or mechanism that is used in the bill to bring occupational disease within the, completely within the workers' compensation system? Do we have any idea—do you have any idea what the impact will be? It seems from the discussion I have heard here, unless we know that, we might have to well consider alternatives destruction of the system.

Mr. SAPE. Let me try and respond—so far as legislative oversight and the abdication of legislative responsibility, and, Dick, you know better than anybody, things don't change up there.

The system of legislation, or the system of development of legislation through compromise always leaves something to be desired. If we could write a perfect bill and pass a perfect bill we might have done so. Let's say we are doing the best we can.

Mr. SCHUBERT. I have a lot of confidence in you personally.

Mr. SAPE. So far as the constitutional question goes, let me say this much: we are all aware there are certain constitutional questions on the whole approach in the legislation. Dr. Larson in Salt Lake City made that manifestly clear to a standing ovation of the assembly.

There is no question in my mind, but we are taking a hard look at what the constitutional questions are, and we are prepared to make certain changes in the bill. I would state, however, there is a bottom line below which the committee will not go. If that bottom line still involves serious constitutional questions, then I guess it is up to the Supreme Court to decide that at the appropriate time.

I think there is no question, for example, that whatever the Court decision is in the *League of Cities v. Dunlop* case, will have some impact on the final version of the legislation. But, we do expect that ruling before the legislation goes to the floor. We talked before about the timing of the opinion of the Court and the importance that would have on the final report of the workers' compensation bill.

John, on the question about the overburdening of the system, I don't have an answer to that. Yes, we are aware of the problems of the strains we are placing on the workers' compensation system right now. On the other hand—you know—we talked about legislative reality, and there is a problem on the Hill called jurisdiction, and there are a number of committees, only one of which is the Labor Committee from which this bill emanated.

There is no question in anybody's mind the Labor Committee is perhaps one of the most liberal in the Senate. If we change the legislation too much, to take it out of the labor ambit, we also lose jurisdiction over that legislation. If you are ever going to see a workers' compensation bill in the Senate, it will have to come out of the Labor Committee, but within the jurisdictional confines of how we develop legislation. And, I am being very candid and realistic about how things work. Additionally, I am not persuaded that the workers' compensation system can't handle it.

Mr. LEWIS. I don't know.

Chairman BUNN. Are there further comments from the panelists? [Pause.] Comments from the audience? [Pause.] We have about 5 more minutes that we will address this issue. Yes, sir, Mr. Anderson.

Mr. ANDERSON. I think the key point is the one Dr. Mancuso mentioned of new diseases, lung cancer to be considered. All of the other dust diseases are already compensated in some fashion in some States and could be absorbed by a system. But, if lung cancer is to be included, you will have some 80,000 deaths this year from lung cancer, and I would guess 60,000 are in the work force, or were in the work force—they may be retired. The percent of casualty or degree to which work contributed to that risk of developing lung cancer, as compared to cigarettes, smoking chimneys or oil, could vary from one part per million to 99 percent due to work, and unless you draw a line, you are going to have to, in equity, take every single one, and that is the thing that will overwhelm a system.

Chairman BUNN. Any further comments? All right, thank you very much, we will move into the next area.

[Conference off the record.]

Chairman BUNN. The next area of the program deals with the black lung issue and it has many implications to the overall subject we have been talking about. The paper that has been prepared on this area has been prepared by two people. The first person who will speak as a copreparer of the paper is Nancy M. Snyder, Associate Director for Coal Mine Workers' Compensation, Employment Standards Administration, U.S. Department of Labor. Ms. Snyder.

Ms. SNYDER. Thank you. Two points before we begin. We had a paper of 60 pages and we will summarize it in 20. We urge the persons that do have copies to please read the paper, particularly the data and the appendixes.

The second point—I wish I didn't have to say this—but we have heard too often in these few days statements that dismiss black lung as unique; as a thing apart. We believe that that is naive. We submit there are lessons to be learned. And except in a few rare cases in Appalachia, there is no such thing as black lung doctors or black lung lawyers. These same people are involved in the processes we have been discussing in such detail in these 2 days. And their response to the black lung mandate cannot be expected to be radically different as they meet the challenge of occupational diseases to be recognized in the future.

Since July 1, 1973, the U.S. Department of Labor has been charged with the responsibility for the administration and enforcement of section 415 and part C of title IV of the Federal Coal Mine Health and Safety Act of 1969, as amended by the Black Lung Benefits Act of 1972. These provisions primarily establish a Department of Labor administered and employer financed workers' compensation program for miners who are totally disabled due to coal workers' pneumoconiosis, black lung, and the sequelae of that disease, and for the survivors of miners who have died due to or while totally disabled by that disease.

The singular purpose of this compensation law provides a unique opportunity to study the theory and practice of providing occupational disease benefits within the context of reasonably traditional workers' compensation principles.

While the Federal Black Lung Benefits Act of 1972 utilizes many principles which have evolved from the experience of State compensation systems, primary among which is the notion of individual employer liability, there are a number of points of departure.

The act is the first compensation law especially tailored to meet the needs of the victims of a single occupational disease. The law also marks the first Federal effort in those areas of workers' compensation traditionally reserved to the States.

Perhaps, most importantly, the act and implementing regulations are unique in that they attempt to define a compensable condition both from the medical and socioeconomic standpoint in minute detail.

It is the intention of this paper to permit the Federal black lung benefits program to tell its own story, to develop a phenomenology of its own which may justify or condemn it, which may point out new directions in occupational disease compensation, or which may simply teach a few hard lessons.

The authors have selected as a focal point for this study the expectations of those diverse groups which came together to make the Federal black lung law a fact. Among these groups are labor, and in particular, the United Mine Workers of America, and the black lung associations, the coal and insurance industries, the health professions, and the Federal Government.

It is hoped that through the actions and reactions of these groups on a background of the operational realities of the Federal black lung program, the black lung story will emerge.

There is a mystique about coal miners and the coal mining industry which has always captivated the American people. Perhaps it is the danger of coal mining. Over 100,000 miners have died in coal mine accidents since 1884. Perhaps it is the working conditions, or the rural mountain setting, or the violence which has accompanied the history of the miner's unions. The miner and mine operator are often depicted as rugged hard fighting individualists. Even today notwithstanding the homogenization of lifestyles in the United States, the mystique persists.

It is possibly for this reason that the public has demonstrated an increased awareness of and responsiveness to the needs of coal miners. This awareness and responsiveness is today augmented by a renewed recognition of coal as a critical natural resource.

When congressional hearings first commenced in February 1969, the intention seemed to be to reform the coal mine safety legislation of the past three decades. It was not long, however, before the topic of black lung came to dominate the hearings.

Extensive and detailed testimony was delivered by a number of physicians with coal field experience, and by employee as well as Government representatives outlining the toll of life and health attributable to black lung.

Even with the vast amount of evidence presented, well in excess of 5,000 pages, the earliest bills introduced in 1969 focused exclusively on dust control and mine safety. It was not until September 1969, and after Senate bill 2917 was reported out of committee that two proposed compensation amendments were submitted. The bill which emerged from the conference committee was quite different from its predecessors.

On December 30, 1969, the Federal Coal Mine Health and Safety Act became law.

The eligibility criteria contained in title IV, were, for the time, unique in that they incorporated three statutory presumptions to assist claimants in establishing entitlement. Two of those rebuttably presumed a causal relationship between pneumoconiosis, or in the case of a deceased miner, a respirable disease, and the miner's coal mine employment, if that employment spanned 10 or more years.

A third presumption termed irrebuttable, made complicated pneumoconiosis when diagnosed by autopsy, biopsy, or X-ray, automatically compensable. Two agencies, the Department of Health, Education, and Welfare through the Social Security Administration and the U.S. Department of Labor were charged with the responsibility for administering the black lung program.

Under the first part of the program, part B, the Social Security Administration was authorized to pay benefits from Federal funds to miners. The federally financed program was to run until December 31, 1972. Claims filed subsequent to December 31, 1972, were to be filed under an applicable State workers' compensation law if such law was determined by the Secretary of Labor to provide adequate benefits for total disability or death due to pneumoconiosis.

If no such law was approved by the Secretary of Labor then the claim could be filed with the Secretary (p. C). The Secretary was authorized to identify a coal mine employer who was responsible for the payment of benefits to the claimant. If no coal operation could be identified, then the Secretary was authorized to pay benefits from Federal funds.

It was not long before dissatisfaction with the federally funded portion of the program began to occur. During the 1969 hearings a number of physicians urged the Congress to enact a provision which would prohibit the denial of black lung claims solely on the basis of a negative chest X-ray. Instead, Congress deferred to the Public Health Service and the National Institutes of Health to develop appropriate diagnostic approaches toward the determination of claimant eligibility.

Although evidence of the fallibility of the X-ray continued to mount, HEW defended its view that a negative X-ray was definitive as to the absence of pneumoconiosis.

Similarly, there was dissatisfaction with the newly incorporated definition of "total disability" adopted by the Social Security Administration from its title II disability program which considered an individual totally disabled only upon a showing of the inability to engage in any gainful employment.

And still further, many miners suffering from respiratory diseases, and other conditions, such as cor pulmonale, which many physicians felt were directly related sequelae or symptomatology of pneumoconiosis, simply could not obtain benefits.

By late 1971 three bills had been introduced to amend the existing law, and in December of 1971 extensive congressional hearings began.

At many different times it was proclaimed that the 50-percent claims approval rate of the Social Security Administration was not enough, and it is probably for that reason that Congress moved to decisive action.

The medical support for a modification of the law's eligibility criteria was convincingly presented by many witnesses. The Social Security Administration argued that the cost of the program had already far surpassed expectations. Those who opposed change both in the scientific community and in the Government did so primarily on the basis of the argument that it would be improvident to act until all the evidence was in or until further resolution of the medical and diagnostic controversies could be achieved. Congress was not prepared to ask the afflicted miners, the widows and orphans who had petitioned for change, to wait.

The 1972 amendments termed the Black Lung Benefits Act of 1972, added a number of new provisions to the original act. The term "total disability" was redefined to permit a miner to receive benefits if his pneumoconiosis prevented him from engaging in his regular coal-mine work, regardless of his ability to perform other gainful work.

The coverage of the act was extended to include miners employed in surface mines and to permit the survivors of miners totally disabled at the time of death to receive benefits regardless of the cause of the miner's death.

Of critical importance were the medical expansion features of the 1972 act which included a new rebuttable presumption of total disability due to pneumoconiosis if a miner or survivor could demonstrate the existence of totally disabling respiratory or pulmonary impairment and 15 years of coal-mine employment.

A companion provision prohibits the denial of a claim "solely on the basis of the results of a chest roentgenogram," and requires the utilization of all available diagnostic techniques and any other reasonably probative medical or nonmedical evidence tending to demonstrate the existence of a totally disabling respiratory or pulmonary disease.

Finally, the amendments extended Federal responsibility for the payment of benefits until December 31, 1973.

Once again Congress has responded to the urgent concerns in the coalfields. The coal operators obtained an 18-month reprieve from liability. The miners and their representative groups received liberalized eligibility criteria and a generally expanded act.

The health profession received a statutory authorization of funds for research.

The States were awarded more time to improve their laws, and the Federal agencies were admonished to do better, which it seemed, at the time, was a fait accompli under the new law.

On July 1, 1973, the Department of Labor began to enforce and administer the letter and spirit of the Black Lung Benefits Act of 1972.

The diverse groups who appeared joined in support of the amendments soon divided in their expectations and objectives. Since the goals of each of the constituent groups were, and continue to be, incompatible, the evolving program realizes little universality of acceptance.

The Black Lung Benefits Act of 1972 was an attempt to resolve inequities in the earlier legislation and to respond to the plethora of claimant complaints to liberalize and expedite the determinations of

eligibility. Although hailing the amendments at first, the United Mine Workers of America in less than a year expressed disenchantment.

In testimony in June 1974 the union predicted proportionally higher claim denials by the Department of Labor than by social security, pointing out the differences in the medical standards utilized by the two agencies.

Thousands of miners and widows soon petitioned Congress and the press to right the wrongs arising from the workers' compensation features of the act, which saw widows being denied under a 3-year statute of limitations, saw the burden fall to the miner to argue his case before the industry in a new tier of adversary proceedings, and who saw approval rates plunging downward from the highs enjoyed earlier under the Social Security Administration.

In the paper there is a table of comparative approval rates. Let me summarize that for you. In 1971, the social security approval rate was 49.0. April 30, 1971, 49 percent. December 31, 1971, 49.5. December 31, 1972, 49.3. December 31, 1973, 62.1. December 31, 1974, 64.2.

In that same year Labor's approval rate was 18.7 and this past fiscal year the Labor Department's approval rate was 13.5.

Regardless of the reasons for the Department of Labor's lower approval rate—such as a residual population, lower dust levels, stricter medical standards, and high widow denial by statute—the expectations of the claimant group and the potential claimant group were not being met (app. A). They have been conditioned to another and distinctly different approach to the adjudication of black lung claims.

The coal industry had other expectations; coal operators warned of high-premium rates, bankruptcy, increased coal costs and inordinately high medical treatment costs tied to a large liability generated by a high level of approvals.

When the National Council on Compensation Insurance began negotiations with its subscribing carriers many of those carriers discussed an initial insurance rate of \$100 per \$100 payroll.

In a study, J. Huell Briscoe & Associates of Chicago estimated an annual coal industry liability of approximately \$250 million for claims of active miners alone. An additional \$2 billion-plus liability was estimated to pay medical benefits only to miners already receiving benefits under the social security part of the program.

The National Coal Association predicted that the tremendous cost impact of black lung would drive many marginal operators from the industry.

The American Mutual Insurance Alliance in April 1974 charged that the "unscientific" medical criteria that had been incorporated into the original 1969 act and in the liberalization of those criteria in the 1972 amendments were "grossly inappropriate."

It transformed title IV into a "pension program for coal miners without regard to whether the miner is in fact disabled or whether the disability if any resulted from occupational exposure."

The industry in this same testimony noted actuarial studies that placed potential liability for medical expenses at \$12,000 to \$20,000 per award under the Department of Labor's program.

After further extensive discussions and actuarial studies the insurance industry estimated premium costs for the combined State and

Federal programs for occupational diseases arising out of underground coal mine employment as approximately \$25 per \$100 payroll.

There is a chart of premium rates in the paper. I don't have time to review it, but I will generalize by saying, while private insurance carrier rates have not changed materially, there is some little downward movement there, to minimal adjustments upward.

The State of West Virginia, however, which operates an exclusive State fund, reduced rates applicable to the Federal risk by 44 percent and 58 percent respectively for underground and surface mine exposure.

As additional claims experience is developed, it is anticipated that State regulatory agencies will adjust private carrier rates accordingly. At present 53 private carriers and 4 State funds are insuring Federal black lung obligations on behalf of 3,064 coal operators.

The Department of Labor, reflecting a lower than projected rate of approvals, is reducing, as appropriate, the amount of securities or indemnity bond necessary to secure obligations of the 61 coal operators we presently have qualified as self-insured.

And I was very happy about this. We are reviewing each anniversary date of the company and running our formula, of course, and we have, as I said, reduced the indemnity line.

At the time of this report there is no available evidence that the provisions of title IV have contributed materially to the failure of large numbers of marginal coal companies.

While the cost of coal has risen considerably since December 1973, economic factors other than occupational disease liability entered during this period. All of us were familiar with, certainly, the energy crisis, inflation, increased profit margin, labor costs, and the strong export demand were variables of predominant impact.

The Department of Labor's medical treatment costs under part C are in sharp contrast to industry predictions. Assuming that there is an overlap in treatment payments with other programs such as medicaid, and adding an overlap factor, the Department of Labor's experience to date is \$325 per patient year.

Using a survival rate of 7.5 years post entitlement, a lifetime medical treatment cost per beneficiary is estimated at \$3,740.

Fewer than 10 percent of those enrolled in the treatment program submit bills in any given month. If diagnostic costs are added there is an average one-time cost of \$125 per claimant. Total benefit costs of the Department are as follows: Fiscal 1974, \$1,606,200 and fiscal 1975, \$7,171,500.

These figures reflect total Federal costs. Since the Department of Labor initiates interim payments to claims in protracted litigation, 30 to 50 percent of the above will be assessed against the industry.

The expectations of the medical-scientific sector were reflected from the research both here in the United States and abroad. Since intensive research efforts into the causes and character of black lung disease started little more than 10 years ago in the United States, there is a paucity of material. The authors will not attempt to analyze the varying scientific opinions as to the adequacy of diagnostic criteria nor explore causality issues. These topics are discussed elsewhere in this conference.

Since baseline data were not, and still are not, available on coal mine employment in the United States, the Department's expectations were not in all respects valid. Planning staffs had first estimated a base of 40,000 new claims for the first fiscal year of operation and an additional 20,000 refilings of miners approved by the Social Security Administration but seeking medical treatment benefits under the new part C.

The base number of new filings projected could not have been more accurate. In fiscal 1974 the Department received 39,910 new claims. The number of refilings, however, had been miscalculated with only 1,552 refilings in fiscal 1974, and only 3,369 cumulative through October 1975.

The reasons for this reluctance on the part of miners to file for medical benefits are now quite obvious:

The older miner is covered by Medicare or other health plans and the symptoms of black lung are often compatible with those of old age.

A miner does not wish to risk becoming involved in an adversary proceeding with his former employer for medical treatment only.

There is an aversion on the part of a miner already receiving social security benefits to open up his case with another agency even though the Department of Labor and Social Security have assured that only if fraud is discovered would there be any chance of loss of present benefits.

Higher approval rates have been anticipated primarily because the impact of not being able to utilize social security's interim medical standards had not been fully estimated. The Department's planners also assumed that miners' widows were aware of the approaching new 3-year statute of limitations having been informed through a strong public information program by social security in the spring and fall of 1973.

A combination of a lower number of total filings, a lower approval rate, and a higher Federal outlay during protracted litigation necessitated readjustments in the Department of Labor's cost projections from those originally expected.

Under most compensation laws the burden of proving entitlement is on the claimant. It is only through the use of presumptions and/or definitions that the burden may be shifted to the employer.

By shifting the burden to the employer Congress has largely made the individual coal operator responsible for the financial consequences ensuing to the claimant as a result of physicians' inability to reach a consensus in the area of coal dust related respiratory diseases.

While research data might have supported a different approach, Congress made the socioeconomic judgment that the cost of uncertainty was to fall upon coal operators rather than disabled miners and the survivors of deceased miners.

In order to establish entitlement to benefits, a miner must prove: (1) That he is suffering from pneumoconiosis; (2) that his pneumoconiosis arose out of coal mine employment; and (3) that he is totally disabled by pneumoconiosis.

The survivor of a miner must prove that the deceased miner was totally disabled by pneumoconiosis at the time of his death or that the miner died due to pneumoconiosis.

The problems of proof which initially confront the claimant are almost completely circumscribed by a maze of presumptions, evaluatory criteria, tables, regulations, and standards.

In no other instance has a compensable condition been so minutely defined. The result is, of course, a legal disease which is, perhaps, unfamiliar to the medical profession.

The fact of causal relationship between the disease and coal mine employment is normally no difficult matter for the black lung claimant. The 10-year presumptions of causal relatedness serve most claimants in this regard. In order to prove what is ostensibly a medical fact, most claimants need only prove 10 years of coal mine employment. The claimant who cannot demonstrate 10 years of employment must provide medical evidence of causal relationship.

There are, however, significant problems posed by the use of a years-of-employment presumption. While employment periods are sometimes difficult to document due to the destruction of records and the fading of memories, the claimant's own testimony may be sufficient.

Social Security Administration earnings records are helpful in this regard but too often these records are incomplete and only date back to 1937.

Once having demonstrated the existence of pneumoconiosis and its employment relationship, the focus of a claims investigation turns to the question of total disability or death due to pneumoconiosis.

The concept of total disability embodied in the Federal law is primarily economic and social rather than medical. Thus the determination of the extent of a miner's disability is taken away from the physician and entrusted to the adjudicator.

Total disability is defined by statute to mean: "The inability to engaged in gainful work in the immediate area of the miner's residence requiring the skills and abilities comparable to those of any work in a mine or mines in which he previously engaged with some regularity and over a substantial period of time."

In enacting this provision Congress sought to address the realistic employment potential of an afflicted miner who could or should not obtain work in the mines. Pursuant to regulations mandated by the Congress, even if the impairment alone does not result in this inability to engage in comparable and gainful work, consideration of the miner's age, education, and work experience may justify a finding of total disability.

The miner who is suffering from complicated pneumoconiosis is automatically entitled to benefits regardless of his ability to work. On the other hand, a miner who is working at his regular coal mine employment and is not suffering from complicated pneumoconiosis cannot be found totally disabled. A miner working outside the mines may be found totally disabled, regardless of his income, if he is incapable because of his respiratory disease from performing the work he did while in the mines.

Within this framework it is alleged that coal operators will be required to pay benefits to individuals who are not disabled at all but who have simply chosen to pursue other work or who do not wish to work in the mines.

Congress perceived the equities differently. It did not think it proper for medical uncertainties to redound to the disadvantage of

the coal miners. And although some few invalid claims might be approved under the Act that was a far better state of affairs than one in which many valid claims would go uncompensated for lack of definitive medical conclusions.

Congress chose a workers' compensation program as a means to carry forth this intent. The appropriateness of this choice will remain a matter for debate.

Medical considerations alone can justify a finding that a miner is or was totally disabled if his impairment meets the coal mine employment tests noted earlier and if a finding of the existence of complicated pneumoconiosis may be made from an X-ray of suitable quality. However, where only simple pneumoconiosis is shown, additional medical evidence may be necessary to establish entitlement.

The most frequently used additional evidence are the ventilatory test values. A respiratory impairment may be demonstrated on the basis of a ventilatory study in which the maximum voluntary ventilation or maximum breathing capacity and 1-second forced expiratory volume are equal to or less than values specified by height of the claimant.

In the absence of evidence rebutting such findings, a miner who meets X-ray or ventilatory study standards or one of the following sets of medical specifications may be found totally disabled: Blood gas—or—Cor pulmonale with right-sided congestive failure, congestive heart failure with signs of vascular congestion, or other relevant evidence.

Shortly after inception, analysts on the Department of Labor's medical staff began to note wide disparities in the quality of evidence being submitted.

About 25 percent of the X-rays were of such poor quality that adequate readings for pneumoconiosis could not be obtained from the overexposed or underexposed films.

Physicians were either not running three attempts or were not forwarding the required tracings of the ventilatory tests, and clinical examination reports were vague and inconclusive.

In cases where poor performance was habitual termination of the contractual agreement was recommended. The X-ray quality problem continued and in consultation with the Standards Committee of the American College of Radiology, in cooperation with NIOSH, a quality control program was established. Results have been positive with a decrease to less than ten percent of unreadable film at present.

Chairman BUNN. Do you know approximately how much additional time you will need?

Ms. SNYDER. About 5 minutes.

The administrative problem of quality of evidence is noted in detail because in workers' compensation for occupational disease the degree to which evidence is questionable must be reduced to a minimum. The questions of casualty and liability are of such magnitude that the quality of medical evidence should not be a variable.

In addition, there exists in many sections a constant concern that the medical standards themselves need review and revision.

The question of accommodation for claimants at altitudes of fifteen hundred meters or higher has also been raised. Physicians suggesting

revision of the criteria state that at high altitudes, "The spirometries were found to be almost totally worthless."

The general philosophy employed by the Department in establishing its black lung medical treatment program is that while there is no way of reversing C.W.P., important efforts can be made to maintain the pulmonary effectiveness of miners at acceptable levels. The objective of this approach is to improve the quality of life of the afflicted miner to the greatest extent possible, and by preventive care avoid the expense and devastation of an acute respiratory crisis.

As noted earlier in the discussion of expectations and projections, the number of persons seeking treatment benefits is small.

Coal industry response to the liability has been tremendous. In August and September of 1973 two lawsuits, one in Kentucky and the other in the District of Columbia were brought by the coal industry against the Secretary of Labor. They challenged the constitutionality of requiring coal operators to pay benefits to individuals last employed with such operators, the constitutionality of the presumptions and other medical eligibility criteria insofar as those standards would require operators to pay benefits to individuals who were not totally disabled, and the regulatory authority of the Secretary to assess liability against a disabled or deceased miner's last employer.

These cases made their way up to the U.S. Supreme Court, and on December 3, the case was argued, and we expect a decision at any moment. My neighbor argued the case beautifully.

Almost 90 percent of all cases decided against operators at the first level of adjudication have been appealed. Approximately 97 percent of all claims determined by the Department involving a question of operator liability are referred for formal proceedings. Ninety-seven percent of our cases are being controverted by the industry.

There has been tremendous legislative effort. Numerous bills for amendment to the black lung law have been submitted to Congress. There are so many I think we have given up the count.

There is one that is in the House that is pulling it altogether. The coal operators, the union, all are pressing for change.

There is a bill which even includes extension coverage to coke oven workers and iron workers and all respiratory disease victims of all occupational diseases. And, in conclusion, we would like to say despite the lack of general satisfaction with the Federal black lung program, it is clear that it has been successful as an instrument to provide compensation to victims of black lung who over the years have been unable to obtain such redress.

Although a genuine effort has been made through amendment and regulation to make the act fulfill the expectations of those affected groups, it appears that in certain respects those expectations can never be met through the mechanism of a workers' compensation program.

It is extremely difficult to design a governmental program which can provide an absolute "right" to a given class of individuals at the sole expense of another limited class, regardless of the existence of a rational nexus between the right and the liability.

Nor would such a program seem particularly equitable. What is needed, perhaps, and not just from the standpoint of the Federal

Black Lung Act, is a reevaluation of objectives, and in light of that reevaluation, a reassertion of perspective.

Chairman BUNN. Thank you, very much. The response will be by Mr. McMahan.

Mr. McMAHAN. Nancy's statement that our case may be ruled on at any moment suggests I get back to my office to receive the bad news.

I would like to keep my remarks as brief as possible, because I think this is an area that could benefit from a good deal of panel and audience discussion. I think that is the case because what we have here, the black lung experience, embodies about every problem and to the extreme degree we talked about here, and that is probably the only example of legislative response to these difficult problems.

Black lung disease, and that community of workers that suffers from it, present an especially difficult question for many policymakers, any legislative body that has a fairly well-defined community of workers who suffer from economic disability that arises from many factors.

Very little mobility as far as other occupations go; a great deal of mobility within their industry over the years; a disease that some people would describe as latent, and some not; a raging controversy in the medical community about what coal workers pneumoconiosis is; how you get it, why you get it, and what it does to you.

To further complicate things, the legislative response, in my opinion was ill-conceived, hasty, ill-thought out, the problems were not analyzed, were not appreciated by Congress, and even if we indulge the conviction Congress knew what it was passing, it was a committee product.

Most of the compensation features were inserted at the last moment, and frankly, it was a device. A device to solve an economic problem through a convenient—seemingly convenient—existing vehicle, the workers' compensation system.

What Congress came up with was ostensibly a compensation law providing benefits in connection with a single occupational disease. Mr. Barth in his description yesterday was too kind. It does not—the law does not represent a legislative attempt to deal with a variety of diseases manifested by these workers, some of which may or may not be work related. It is more difficult than that.

Ostensibly the law deals with one disease that everyone accepts as work related, but, for many of the reasons Nancy discussed in detail, expressions of expectations from various sectors of the society, Congress stuck with the one disease, but created a legal disease. So that adjudicators, administrators, the industry and the Labor Committee are confronted with a law that provides compensation for coal miners' pneumoconiosis, something that at least until recently was medically describable. But, in the law, coal workers' pneumoconiosis becomes also a variety of other respiratory diseases. Chronic bronchitis, it becomes emphysema and can become lung cancer.

It is not a case of Congress saying, making a reasoned judgment that chronic bronchitis may or may not be caused by breathing coal dust, or emphysema may or may not be caused by breathing coal dust. What Congress in effect said is that any respiratory affliction, essentially—and I am exaggerating and oversimplifying somewhat—any respiratory affliction and a good many economic afflictions such as unemployment will be considered a disability due to coal workers' pneumoconiosis.

They achieve this through diagnostic criteria, parameters and presumptions, for determining diseases and total disability from it, which does not comport with reality to any great extent, especially medical reality.

I think that the almost universal nonacceptance of the black lung program as a solution to the problem that was perceived, in itself says something about the legislative choice that was made.

I think the difference in experience that we see between the Labor Department's administration of its part of the program and HEW's administration of its part, also suggests that the problem was not nearly as great as some had said, or that there is now administration at one point or another.

Having dealt with Nancy now off and on for 2 or 3 years, I cannot believe that the Labor Department is wrongfully denying claims. Or that they are turning down claimants under the law who should be entitled.

It suggests the law from the claimant standpoint is far too conservative and the Labor Department is administering it as it should and it is unfortunate that more people aren't awarded claims, and yet we see the law is administered in the part B program, and as perceived by a good portion of the scientific community and business community, considered grossly liberal. And, if you examine the claims that have been allowed, even though there haven't been many, they are as equivocal and ambiguous as any you might find.

We do have people being granted benefits who are working, who have worked, who do not suffer from coal workers' pneumoconiosis, and probably didn't suffer from any respiratory disease to a disabling extent. It is an unfortunate legislative response and it is a law that I think we can learn some lessons from.

We can learn, perhaps, the workers' compensation vehicle is not appropriate for dealing with a broad spectrum of respiratory diseases in an aging population and an economically disabled population.

We can learn that it advances neither the medical man's cause or a social cause to provide economic relief to use compensation as a vehicle for what is in effect all of the disabling diseases of an aging population.

I could speak at length on how this unfortunate result was achieved.

Presumptions, and my pet peeves are presumptions that are irrebuttable, in fact, whether they are labelled rebuttable or not, and which constitute definitions; in effect, define a legal disease.

There is no question a legislator can burden a benefit system with all sorts of goals. You can make a compensation system an unemployment benefit system, but when you do that you bring about a distortion in the system for distributing that cost in your society because frankly, a pension system ought to be viewed as a pension system, and an unemployment system ought to be viewed as an unemployment system if we are going to make rational judgments on how to solve our problem.

I would like to speak very briefly about some of the statistical matter in this paper, and I think Nancy will agree with me, it has all been drawn from a very limited experience under the Labor Department's program. There have been very few claims. I think that it is substantially aberrational and much more data are needed to come to some conclusions about the cost of the program.

I think right now what the Department has seen is an unusual claimant population. The few that have been awarded benefits are the ones

that were probably the most noncontestable and probably represent a residual of aging claimants. But, as the program continues on, as it is expected to, the current younger working force will be claiming.

Now, Nancy mentions she has discovered a medical treatment that costs \$325 per year. I would be interested to hear what some of the physicians here would say about the cost of adequately treating a case of complicated coal workers' pneumoconiosis throughout a man's lifetime. I think that we do not doubt these very low medical claims have been made by claimants, but I think it is not our goal to allow that to continue; that we wish to educate these people and provide optimum medical treatment. In fact, that is mandated in the act as well, and that cost is going to be substantially higher. I also have no doubt the claimants Nancy has seen have died within 7 years after the claim.

But, I have talked to many actuaries and insurance people who see a much, a life expectancy for diseased miners much longer than that, double that, and that difference in the statistics. I think, just must be the result of a very small population that the Department looked at so far.

Chairman BUNN. Are here any comments from the panel?

Mr. KALMYKOW. First I would like to comment and commend Nancy for the excellence of the presentation. It is fully up to the standards, the high standards she has set in the past.

But, as she has very aptly indicated, we are compensating for a legal disease, and I may add, a legal disability. This is an area of some concern.

I would like to point out, moreover, some of the facts. As she very aptly pointed out, this condition was originally administered by the Social Security Administration. There was a report by the committee staff of the House Ways and Means Committee, which we have been referring to, and it has indicated that the social security disability program is in serious difficulty.

Chairman BUNN. Mr. Kalmykow, may I ask if you would please speak up. I think the mike is probably not working properly and we won't get into it until the recess.

Mr. KALMYKOW. As I was indicating, there was a report of the House Ways and Means Committee on the subject, and it has indicated that the administration of the black lung program by the Social Security Administration had a very adverse effect on the administration of the whole disability program.

I will quote very briefly from some of their findings:

The committee staff believes the black lung program had a major impact on the Social Security Disability Program in diverting essential administrative and program staff from their duties with regard to the Social Security Disability Program and implementing the attached program.

And to quote further:

At the present time, the black lung crisis, they call it: has moved from the hearing stage where Social Security disability cases are being literally shunted aside so that the flood of black lung cases can be dealt with. The forces of Social Security staff litigation are already hard pressed and will soon similarly be adversely affected and their ability to carry out Social Security disability duties will be further impaired.

It goes on to that effect. I don't want to go further. But, I think that is the major point I want to make.

That is to say, the figure I quoted, some \$90 for a single man and some \$300 for a man and his family for this condition. Now, I think—and I was amazed that according to the archives of environmental health, and that is an article entitled “Mortality of Appalachian Coal Miners, 1963 to 1971,” which describes a followup on the original study of the public health service. It says, “Effects of pneumoconiosis, years spent underground, cigarette smoking, and obstructed pulmonary disease, to the length of life were examined. The mortality for actively employed miners was 7-percent less than the expected death rate for all men in the United States.” I was amazed to hear that figure.

It does go on to say that, and I must add:

Ex-miners, many of whom are retired because of ill health, had a death rate twenty-four percent higher than expected. While simple pneumoconiosis did not affect life expectancy, complicated pneumoconiosis was associated with premature death. Cigarette smoking and airway obstruction led to excesses in mortality.

Those were very interesting findings so far as I am concerned in the light of what we have been talking about for the last couple of days.

Nancy, I hope you don't mind—this is no reflection on your very capable administration of the program—but your own tables to which you indicate—point to us—indicate a flogging of 83,800 claims since—what is it? June of 1973, isn't it?

Ms. SNYDER. July.

Mr. KALMYKOW. Of which 79,111 are still in the process of—

Ms. SNYDER. You are reading it wrong.

Mr. KALMYKOW. Maybe I am.

Ms. SNYDER. It is 43,000 still in process.

Mr. KALMYKOW. Well, what is the 79,000?

Ms. SNYDER. Claims received. There is a gap between the time it is filed in the field and the time they come in for processing.

Mr. KALMYKOW. The Department has received 83,000 reports, right?

Ms. SNYDER. Reports that claims have been filed throughout the United States, of which some 79,116 have been received.

Mr. KALMYKOW. Are in process, it says.

Ms. SNYDER. That is right.

Mr. KALMYKOW. That 28,192 were not awarded benefits.

Ms. SNYDER. That is right.

Mr. KALMYKOW. The remaining claims are in process or pending decision.

Ms. SNYDER. No, no, no.

Mr. KALMYKOW. I am reading—

Ms. SNYDER. There are 28,192 denials.

Mr. KALMYKOW. Right.

Ms. SNYDER. All right. Let's define denial. We give them a year in which to submit additional evidence and to turn around the case or request a formal hearing. It is in process, but there is a decision. Do you see what I am saying? It is a denial we have denied it.

Mr. KALMYKOW. But they haven't been adjudicated finally?

Ms. SNYDER. They go to an informal hearing.

Mr. KALMYKOW. All right. I didn't mean it that way—

Ms. SNYDER. It is confusing.

Mr. KALMYKOW. All I am saying is, under the compensation program, normally that would have been an unheard of situation; for some administrator to face a situation like that would have been flabbergasted.

The only reason I am pointing that out is in discussing the whole program—and some suggestion was made maybe this should be used broadly to cover all diseases—and I was indicating the possible adverse effects that this may have on the injured man—and I was indicating some of the problems that occur when you manufacture a legal disease.

And, if you spread that throughout the industry, I think there will be some adverse effects on the people we are concerned with and have been discussing the last two days, people who have real diseases, medically, and real disability, which should be compensated, and who are compensated today to a large extent.

A lot of people keep saying that the compensation plan isn't paying for occupational disease, or whatever you want to call it, work related diseases. Maybe you aren't.

Under OSHA it is reported—the figure may be wrong—I don't know—whatever this shows—there is 3-percent illness recorded under the OSHA program. And it further says one-third of these are lost time cases.

We have made, for the Interdepartmental Task Force, a survey which indicates approximately 1.35 percent of all lost time cases are payable for occupational disease, which ties very closely to the OSHA figures. So, maybe the 3 percent is too low. Maybe there are a lot of cases hiding, and I would certainly like to find out about it.

But, we are now on the basis of these figures, paying for the cases that are coming out—so that discussion about some people suffering disease and not getting benefits, I think is somewhat questionable. And, we are paying them already, and now, certainly thanks to John and other efforts that we all have made—and I don't want to take credit—we have death benefits and Kepone people are getting \$150 a week which they wouldn't have been getting a couple years ago and were just as disabled.

We have to recognize—

Chairman BUNN. Let me make a comment—I think there is no question the workers' compensation system has been improved in many States and in many areas if the case can get into the system perhaps there are adequate provisions to deal with it.

I think the question is whether or not the statistics we are dealing with, whether on BLS or the other statistics that have been bandied about, the question is essentially whether or not they represent the seriousness of the problem, and that is something that would be of considerable debate if we got into it again. But, I think that is the issue you have to be concerned about.

Mr. Schubert, I believe you have been trying to get the mike.

Mr. SCHUBERT. Three footnotes to what Andy has indicated and is concerned about.

Footnote No. 1, Howard, picks up what you indicated, and I am satisfied after listening as a neophyte in this area over the last couple days, there is a serious recognitional problem on the part of employees who are impacted, infected by something, and they are not sure what it is, and they really don't have enough information to be able to identify that problem with something in their work experience and history, and I am satisfied from what we heard that perhaps we have just scratched the surface with regards to making that relational link.

As you suggested, even when the relational link is made, there is a problem of getting the claim, getting the concern, getting the disease into the system and having it reflected in the system. I would suggest 2 or 3 years from now the numbers are likely to be substantially different.

The other two footnotes—Nancy, the modest person she is, couldn't make reference to these things—so I will in her support and defense.

There has been a fair amount of harking from one side or another about the administration of this program. As I understand it, the Secretary of Labor asked a small group from a very eminent insurance company, to be nameless at the moment, to come in and do a brief but very intensive survey about how the program was functioning, and they were just superlative in their review. I am sure this will become a matter of public record at some point in the near future.

And one other aside—the reference Andy read of the subcommittee's report on the Social Security Administration and the fact that black lung had impeded the Social Security Administration's processing of its new SSI program—I think that probably the Department of Labor people would question whether the Social Security Administration was really giving that much deference to black lung claims.

One of the problems of moving these cases along is to get the full Social Security Administration, not cooperation, but completion of the files so that labor can do its thing in respect to this responsibility.

Now, the generalized concern. Mr. McMahan used a phrase I found to be most fascinating. He said, "There is almost universal nonacceptance of this program." I think that is probably right, but despite that universal nonacceptance, I go back to Nancy's initial comments, that there is absolutely no guarantee this effort won't be replicated again in major part, and I think the problem is simultaneously incompatible expectations.

There are social goals that are perceived. They are probably very legitimate social goals. The only thing that is available is a system in place known as workers' compensation and there is an attempt to take that mechanism and turn it and twist it any way to achieve those social goals.

Unless the experts in this room—which I don't qualify at all—speak up and take some heat and support perhaps the social goals, and at the same time note the limitations of the workers' compensation system, I would suggest we are likely to have additional abominations like the black lung effort.

Chairman BUNN. Dr. Conley.

Dr. CONLEY. I would like to ask Dr. Mancuso a question, if I could.

Earlier he raised a point there is a great deal of evidence that would show the occupational link between certain types of diseases and the occupational exposure, and indicated that future studies in these areas were not needed. In view of what we heard about the problem of presumptions in the black lung program, do you believe, Dr. Mancuso, that we can improve or make the presumptions less problematic than with these other diseases you mentioned?

Dr. MANCUSO. The problems relative to other diseases are not comparable to black lung. These are very definite and specific. I don't think you should make a comparison.

I think the presumptions—and I apologize for the length of time I took. I didn't realize I should have handled that differently—but the point of the matter is, these are definite diseases and the presumption standards are not medically viable.

Chairman BUNN. Dr. Amdur.

Dr. AMDUR. I want to say I read Ms. Snyder's report and I couldn't put it down. It was a fascinating report. However, as a physician, I have to bristle at it in some respects, and those things that made me bristle were the things Mr. McMahan referred to as the most inconsequential cost of treating the people. Pointing out that today hospital costs are anywhere from \$100 a day and up, and we are talking about 1 to 3 days of hospitalization, and ignoring the fact the overall program should be directed to improving the quality of life of the miner as well.

I wanted to quote this from Ms. Snyder's report on page 38:

Neither the coal industry nor physicians they employ to examine claimants have yet accepted the fact that the primary role of the physician in the claims adjudication process is to read X-rays, ventilatory tests, blood gas tests, and report the results. Thus, the physicians viewpoint may be accorded little weight by the adjudicator in formal hearings, especially if it is contrary to the weight of the claimant's evidence. It is only because the regulations are not as precise as many would like that the subjective evaluation by a physician is of significance.

Ms. SNYDER. That is in quotes.

Dr. AMDUR. That is in quotes at the end. And I would point out, this, in essence, reduces the practice of medicine, as it relates to patients, to that of veterinary medicine. One doesn't need a physician—this is a legal disease. Why not bypass the physician entirely?

At this point then I would like to return to something I said yesterday. I made a comment yesterday that I thought that a discussion of the definition of occupational disease—one could use the criteria arising out of or in the course of—and then I said—that disability preceded by active employment and that returning to active employment be anticipated unless the level of disability remained substantial and precluded such return to such employment.

I didn't mean to exclude the slow starters or those of long latency periods.

And, it is to that group specifically I think that presumptions such as are employed in coal mine problems more aptly relate.

I am going back again to the coal mine situation and as I read this over—it seemed to me were I a coal miner I would look forward to the 10th year of service, after which I would leave the mine, after which I would make my claim, and after which I would begin a second source of livelihood subsidized under the Coal Miners' Act.

It will be awfully hard to keep people in the coal mines after they have seen Paree.

Chairman BUNN. Mr. Guy.

Mr. GUY. I don't think you would really have to go that far, Doctor.

I heard the term legal disease on two occasions. I caution against dismissing the program as merely a legal disease. I want to remind you that the black lung program contains definitions, medical disability criteria standards, and presumptions—the very matters we have been discussing for the last 3 days.

I have one question for you, Nancy. In your \$325 cost estimate, is there any evidence of what percentage of the persons have complicated pneumoconiosis?

Ms. SNYDER. We can look back over it. Let me say this, and Mark was going to speak to some of the other issues brought up by Dr. Amdur—again, let's go back to the start, if you will. These miners die in bed. They don't go to the hospital. We don't have hospital costs, or nursing homes. We middle class people die in nursing homes and hospitals filled with machinery that keeps us alive. They want to die in bed. And we don't get them in a hospital.

It is the sociology of the mining population. That may be different from asbestos workers or people who work in cities. The cost may zoom up as they flock to the hospital, but certainly not in the rural population.

Mr. GUY. I don't think you answered my question.

Ms. SNYDER. I don't have it here. I can get it.

Mr. GUY. Is it possible there is a significant number of people with simple pneumoconiosis who really don't need treatment at all that is holding that cost down?

Ms. SNYDER. I don't know what you mean by not needing treatment at all.

Mr. GUY. They need a checkup of some sort. They feel bad. They have a cold. They need a vitamin shot.

Ms. SNYDER. They need occupational therapy and they may have an upper respiratory disease, maybe bronchitis and so on and so on, but really, we are just getting, we are seeing about a 2.7 percent complicated pneumoconiosis across the board, and you might be able to extrapolate from that.

Mr. SOLOMONS. May I respond?

Chairman BUNN. Mr. Solomons.

Mr. SOLOMONS. I think the answer is there may be many claims by persons with simple pneumoconiosis who are not sick in any real sense and don't need treatment. They don't need oxygen. And as long as they are not breathing coal dust, it is not going to get any worse. That is the information I have.

Chairman BUNN. Dr. Halpern.

Dr. HALPERN. I would like to get to Dr. Conley's question to Dr. Mancuso. It seemed to me that black lung certainly is one of the more clear cases, and yet in your response to Dr. Conley it appeared to me as though you are saying it is one of the least clear. I am confused kind of by that. I think there are more complications with some of the other situations and other potential and actual occupational diseases than there are with black lung.

Dr. MANCUSO. It depends on what experience you are deriving it from. My experience relates to the fact that these diseases that were specified—*asbestosis*, *talcosis*, *shavers disease*—these are all easily diagnosed medically by specific X-ray and medical examination, and they are caused by a specific substance. There is no problem in a medical diagnosis.

Dr. HALPERN. OK.

Dr. MANCUSO. That is what I was concerned about, that in the proposal they said that, in effect, you should conduct a study to determine what diseases might be work related, and all I was saying was there was a group of diseases which have already been studied, that have been medically diagnosed to be work related, and therefore you need not do another study.

Dr. HALPERN. Back to the other point. It is true that a person who does not work in a coal mine will definitely not develop black lung, correct?

Dr. MANCUSO. If he is exposed to coal dust he will get it, if he—

Dr. HALPERN. It seems like a much less complicated kind of situation than many of the other potential diseases.

Dr. MANCUSO. I am saying to you I do not believe the other diseases are that complicated. To determine whether they are occupationally related or not. That is all I am saying. I am not getting into any discussion relative to coal mine diseases.

All I am saying, is there are many respiratory diseases and these are specified which it is not difficult—it is in medical literature—it has been in the text book—there have been studies in existence for 30 years and some longer than that—there is no problem of the diagnosis of the other diseases.

Chairman BUNN. Mr. McMahan.

Mr. McMAHAN. I would like to ask Dr. Mancuso—take *silicosis*—I think that is a good example. Would you not have the same problems we have with black lung if you were not allowed to diagnose as you now do? Say you were not allowed to use X-ray, or that you weren't allowed to conclude certain things from X-rays. Say you were not allowed to look at exposure and intensity of exposure, but were only allowed to look at length of employment.

Then, when you had cases of other respiratory diseases mixed in with a potential *silicosis* case, wouldn't it be difficult to distinguish?

Dr. MANCUSO. Certainly. Certainly.

Dr. OSTERRITTER. I think some of the confusion comes from the fact we call it black lung disease. This statement Mr. McMahan just made about *silicosis*—you could call it quarry disease or foundry disease. It is really a syndrome. It is not a disease as if we have a specific etiological agent producing certain symptoms. It doesn't involve the Cox principals, if you will, in medicine. It is a mixture of things.

Mr. LEWIS. I believe from listening and from my experience and reading the paper, the problem is not getting agreement that there is such a disease as *pneumoconiosis* and that it is occupationally related.

The problems that arise in the black lung area are first separating—if it is deemed by the Congress they ought to be separated—separating *pneumoconiosis* from other respiratory diseases that may not be occupationally related. And also in determining whether or not the

pneumoconiosis is disabling and disabling to a point that it ought to be compensated.

I think that one of the phases that we heard from both Ms. Snyder and Mr. McMahan is very important in how we deal with compensation problems in general, particularly occupational diseases and specific programs for specific diseases.

And that is expectation. Every time that you do something in one particular area you create the expectation and concern in other areas.

Those of us who deal with claimants, one of the problems we have is explaining why their case is different from someone else's. Why they are not getting as much money or the same benefits. Why they don't get unlimited damages and benefits as some friend of theirs might have received in tort litigation as opposed to compensation.

When we expand a particular program that is designed to deal with one specific disease, we have to concern ourselves as to what expectation, reasonable or otherwise, that we will raise in other areas of industry and other areas of the country. If in fact we made a decision in black lung legislation to compensate, to over compensate, and to include within the ambit of the legislation and the benefit program diseases which are not occupationally related, you find it is very difficult to explain to an individual why they have not received compensation for a particular disease condition when in fact their neighbor who is a coal worker or coal miner was able to get compensation, as little as the benefits may be right now.

To take a provision such as the definition of total disability that existed within the black lung law, as I understand it it was put in there because there is a serious lack of mobility, occupational mobility on the part of coal miners. So that, for the most part, if they cannot work in the mine, they cannot work period. But, if you took the same definition and applied it throughout the compensation system, you would have a major disaster in terms of benefit levels.

A problem pointed out by the National Commission, indicating that the definition of total disability used by Louisiana, and in some cases Michigan, was inappropriate to the compensation system, yet that is the definition used in the black lung law. It may be in 99 percent of the cases appropriate in black lung, but it is certainly not appropriate for the compensation system in general.

I think we have to be very concerned as to taking a program such as black lung which was intended to do more than provide a simple mechanism to force the coal industry to bear the cost of its production; it does more than that. I think it would be a mistake to take a program like that and apply it to the compensation system in general, unless we are willing to rethink the basis for workers' compensation.

As Mr. McMahan pointed out, there are lots of social values that have to be determined, lots of political decisions which have to be made in this area. But, you can't make those decisions properly unless you rethink, or perhaps think about for the first time, the basis upon which you want to spread the risks or assign the risks or pay benefits.

Chairman BUNN. We will take a coffee break of exactly 10 minutes. (Whereupon a short recess was taken.)

Chairman BUNN. Mr. Solomons.

Mr. SOLOMONS. In our paper, Nancy and I urge that perhaps some hard lessons could be learned from our experience with the black lung

program. I still believe this is true. However, one point which I would like to make is that all the lessons do not point exclusively in the direction of never doing this kind of thing again. And by saying this I do not mean that the approach taken here would be good in any other circumstances.

When I first gained a conceptual understanding of the black lung program it was some years ago when it first came to the Department. I hoped that sometimes perhaps in my lifetime new ideas would emerge for building of a more perfect program of this sort.

A great deal of discussion was devoted during this conference to the recognition of that same sort of fact. I think it is fair to state, however, nothing of that sort is forthcoming in the very near future.

While I cannot speak to the Social Security Administration's administration of the program and their part of the black lung program, I do know they had a virtually impossible job to do and a very short time to do it in.

I do have every day experience with the black lung program and I really don't feel that it is—with all due deference to my former boss—as great an abomination as many people indicate.

In the first place, the fact of universal nonacceptance of the program is of course a fact. Then again, in terms of nonacceptance, we are dealing with expectations and I would urge you all to focus to a greater degree on the realities of the program than upon the expectations.

Our projections, our statistics indicate insofar as the Department of Labor program is concerned, what was expected in terms of costs, in terms of claims volume, has not come to pass, and given the projections we have been able to do over the years, I do not believe this will ever come to pass.

I think the point which Dr. Amdur made is one which deserves some attention. That after 10 years every miner could go out of the mines, get his black lung benefits and go to work somewhere else. This is not the case. In the first place it is very unlikely very many people are going to give up a \$50 a day job for \$300 a month in compensation benefits.

Black lung is the kind of disease which manifests itself most dramatically when an individual begins to age.

Now, there has been some recognition given to the special kinds of provisions this law contains; namely the definition of total disability which is in certain respects based upon an understanding which Congress achieved of the economic realities in the coal fields. There are a number of other kinds of special provisions including presumptions which are related to specific data presented to the Congress.

Now I do not mean to say that in any respect these particular provisions would be helpful in terms of other occupational diseases, but yet conceptually I think they may be. I think that recognizing the fact that it is not very likely anything else is going to come to light in the reasonably near future, and by this data they do not imply the kind of effort made in the black lung area by the Federal Government utilizing the Social Security Administration and in their effort to correct the problem that is a hundred or more years old, is necessarily a good idea. I certainly, I don't think it would be a good idea. What I think would be a good idea is to take a very hard look at the kinds of—at the

framework that has been constructed within the context of the black lung program for the delivery of benefits to people suffering from this particular occupational disease.

And I must take issue with Mr. McMahan in terms of whether we are paying benefits to people who are disabled with something else or don't have black lung or have the legal disease. I see 100 of these cases every month and I have read a great deal of the material that has come out, medical material on black lung, and in terms of the great volume, in light of the cases which we see, it seems to me something really good is being done here. You have a great many people unable to gain redress under the State compensation laws who are getting compensation benefits.

Although there may be some few, and I emphasize the word few, who are getting black lung compensation benefits at the cost of the coal industry for some disease they got from smoking cigarettes for 30 years, I think that in large part the framework which has been developed here is an effective mechanism for the delivery of benefits to these people who need them, and I think it would be very wrong for this conference to take the black lung experience as an entirely negative experience.

In fact, weighing the equities or balancing off the problems against the achievements of this program, it seems to me it may be better in many respects than it is bad.

I think that what may be very helpful at this point is for the Task Force to take a close look at the black lung experience with the understanding there are a great many different ways for attempting to solve the occupational disease problem with respect to individual diseases, or perhaps in general that, and given the fact we are stuck with workers' compensation at this point, and we are also stuck with a great many sick and disabled workers, and survivors of people who died from occupational disease, who have absolutely no place to gain any redress, that we may be able to apply some of the creativity that surfaced here in this conference in terms of new kinds of social programs, new kinds of legislative activities, in terms of perhaps a reevaluation of the taxing structure, a reevaluation of the social security structure, and a restructuring of those particular systems so that they may be used to incorporate occupational disease problems. That some of this creativity used to give rise to those ideas could in effect be used, and perhaps better be used at this point in time to avoid us coming back in 10 years, and in fact talking about the same problem once again. To determine a way in which the occupational disease workers' compensation system in the States could be used, could be reformed, could be changed, reorganized, so that the occupational disease problem, at least as a stop gap measure, could be dealt with.

Mr. BAKER. Don Baker, Chief Clerk and Associate Counsel of the House Committee on Education and Labor.

I had a hand in drafting the original black lung provisions and I would like to defend that "abominable" program, if, indeed that is a useful adjective.

I would like to say also. I have always found it dangerous to compute motives to people.

Mr. McMahan impugns the purposes to the majority of the House and Senate. I find it pretty ludicrous to say that members of the Congress in Maine, the States of Washington and California and Iowa voted for the black lung bills in order to solve the economic problems of persons who at one time were connected with the coal industry. That is just not to be believed. It is not to be explained, I don't think either, by Nancy's reference to the fascination of the American public with the miner and the mining industry.

I think it might be useful for these purposes to try and put in context where the Congress was when we started and how we got where we are.

Dr. Selikoff alluded yesterday to a time in Scotland when the life expectancy of coal miners exceeded that of most of the rest of the population. To a certain extent that may very well have also been true in the American coal mine industry prior to World War II. But, after World War II several things changed.

Prior to World War II the work experience or average weekly working experience of a miner was less than 3 days a week. The seasonality of the use of coal to run factories and to heat homes and businesses meant there were long periods of layoffs during periods of the year.

The Nation prior to World War II, underwent substantially broader cyclical economic changes. This meant there were literally months and months and months and sometimes years when some miners would be unemployed.

More importantly, prior to World War II relatively simple techniques were used in mining. Basically speaking, sticks of dynamite were placed in holes in the coal and it was blown out. On the next shift, which was likely the next day, the coal would be shoveled. The intensity of the dust to which the worker was exposed was relatively minimal.

All this changed very seriously after World War II. There was less seasonal and cyclical economic changes. Homes, railroads, and everybody ceased to use coal to heat and used gas and oil for the most part. More important, was the introduction of new mechanization, such as, the continuous miner, frequently created dust so intense and so thick a miner couldn't see a foot in front of his face.

This led to what the common experience of mankind, who visited or lived in those areas, was, and can only be described, as "an epidemic." Beginning in the late 1950's and 1960's, there was an epidemic of this debilitating disease, which doctors variously called bronchitis, pleurisy, emphysema or, when they died, "coronary arrest." Very seldom, almost never, was black lung or pneumoconiosis mentioned on medical charts or death certificates.

As a matter of fact, from what the medical societies in the States of West Virginia and Kentucky were saying, 4 years before the passage of the Coal Mine Health and Safety Act, one would have to believe there was no such thing as pneumoconiosis. It simply did not exist. And, of course—although the States of Pennsylvania, Kentucky, West Virginia all provided compensation for occupational disease—nowhere, virtually none, one or two miners in each State occasionally got disability benefits on the basis of this complicated, critical, multifaceted, multicaused disease that was inundating the coal fields.

Our committee began to study the problem before I went to work there. From what I was told, the experience in England, Czechoslovakia, and Austria (where some of our people visited and talked with experts who had dealt with this disease for some time) it was very difficult to diagnose. It depended on who you talked to and whose expert, but there was range of views as to the certainty with which this disease was detectable by X-ray. These experts indicated that in from 5 to 7 percent of the cases of pneumoconiosis of such a character that it was completely debilitating and totally disabling, X-ray would never show it. In fact they said, so far as they knew, there is no way to medically demonstrate it except by autopsy. That is what they told us.

Now, faced with that situation and faced with a great controversy in medical testimony, the Congress wrote a law in which it put a bottom line. It used the roentgenologist definition of complicated pneumoconiosis, and it said, that's the bottom line. And we said to the administrators, and perhaps as Mr. Shubert said, we were putting an unfair burden on them, but we said, that is the bottom line. You look at these cases, we know this is a complicated business, we don't know all the ins and outs, and we hope you can get some medical experts together and come up with something that is reasonable. But be generous because we know, Congress knows, there are a lot of people out there that have the disease and many of whom have died from this disease, and be liberal, but you administrate the program.

Now, simultaneously (and this is important, I think, in recognizing what Congress was trying to do) the major part of the Coal Mine Health and Safety Act had to do with coal mine safety and health preventives. Based on the best evidence that we had, we provided dust standards, which the Congress demanded were to be systematically reduced over time. The expectation was that about 3 years after we passed that act, dust conditions in the mine would have been such that no one entering the mine, or very few, should have been expected to get the disease.

The Congress undertook to take the burden of the first lump, as we referred to it, the residual cases, and have the Federal Government pay for them. The theory was the American public had all profited from coal and the production of coal and energy and, therefore, we would equitably spread it across the public and not impose it on the industry immediately, but hoped to work to that end.

It was the hope and expectation of Congress that there would be a very precipitous drop in the number of black lung cases. And, if the Interior Department's reports on the dust levels are to be believed (I will be frank and say I believe there is some reason to doubt them) then there should be virtually no black lung in another 10 years or so. In the meantime, there is going to be a drop off.

I made reference to my doubts and the GAO listed some serious doubts about the administration of dust monitoring, and there are some horrible stories about operators putting buckets over—

Chairman BUNN. I hate to interrupt, Mr. Baker, but could you please bring your remarks to a close. We have a very tight schedule and I would like to—

Mr. BAKER. I am completed. I will say this: if the medical profession and the legal profession dealing with workers' compensation don't provide better tools and better information, and if we as a society are unable to learn more, I think it is inevitable, when crises arise, the Congress is going to act to try and do something. In the face of very serious problems of national import, the Congress, I can tell you, will act. It won't sit still.

I hope some of the suggestions relative to getting case histories and learning more about diseases will bear fruit. It has struck me, that is perhaps something we should do more thinking about in our drafting of any legislation that comes up. Then, hopefully, we won't have some like the black lung bill where Congress tries to be generous. From our point of view, if there are many getting benefits that don't deserve it, then there are an equal, and possibly greater number who are not getting benefits who are entitled to them. The Congress then got furious and rapped the administrators and changed the law to inject more presumptions, which you don't like, but they were responding, in frustration, to the fact the administrators were not responding to the problem as they saw it, and I warn you, they always will.

Chairman BUNN. I feel compelled to give about a two-sentence response to the last part of your comments.

That is one of the principal reasons this conference is taking place, it is true, when there is a serious need such as the need that was apparent in the coal mining area, for the coal worker and the coal mines, that the Congress does react frequently under crisis conditions.

Now, I think there are many lessons which I will allude to in a moment in my summary that can be learned from the coal mine or black lung experience. But, that is one of the principal purposes of this conference, to try and pull together as much expertise, interchange of ideas, to try and decide what is the best way, the preferable way, to deal with this problem which appears to be merging as a very serious problem, not only in coal mining areas, but in perhaps many other areas.

I want to conclude it because we really don't have much more time and Mr. Schubert has one more comment that I think he wants to make, and then we will wrap it up.

Mr. SCHUBERT. I used a word which I probably, in retrospect, shouldn't have, because someone will get the feeling I am not sympathetic with the claims of people who are afflicted by pneumoconiosis or any one of the diseases that comes out of working in the coal mines. And I certainly am not only sympathetic but I think I have been supportive all my private career for those kinds of problems.

I further think, in hindsight, and Don is right, Congress responded with what they had in hand, and that behooves us, as he suggests in his last couple of paragraphs, to really do a job so Congress has something a lot better to work with. That is why I think, as Howard suggested, a conference of this nature is absolutely indispensable before we tackle some of these problems.

Chairman BUNN. I will indulge one further comment from Mr. McMahan.

Mr. McMAHAN. Mr. Chairman, feel as a matter of personal privilege I must respond to the gentleman's remarks.

I suggested in no real sense did Congress or the legislative process have the opportunity to consider the workers' compensation provisions of this bill before they were passed. The House Education and Labor Committee reported out the House version on October 13 or so of 1969. The House passed it on October 27. It has no workers' compensation provisions in it, that federally financed the program for complicated pneumoconiosis.

The Senate version of the Coal Mine Health and Safety Act had no occupational disease provisions at all. Those two bills went into conference, and the conference committee staff—I wish Mr. Mittelman were here to substantiate it—inserted the compensation provisions. It was reported out on December 16 with those provisions in there for the first time. It was passed by the respective Houses on September 17 and 18th.

I do not think that we can realistically say the compensation provisions of that bill in 1969 had any real legislative consideration.

Mr. KALMYKOW. It was signed on December 30.

Chairman BUNN. Gentleman, we could have much more interchange on that, but we must move on.

Before we go into the next area, which is a real critical area, we have really only touched on the periphery of, and I want to try and make an effort at summarizing some of the key points related to the issues that we started out to address.

The first issue: is there a significant distinction between occupational disease as commonly defined and work-related diseases as cited in the National Commission report?

I think that the answer to that is the general consensus is probably the term "work related" is a broader term than the traditional use of the words "occupational disease." As to how much broader, I don't think anybody knows. We have no experience on that, and so, I think we can best say it is a broader term and probably would encompass more diseases than is encompassing at the present time.

On the definitional issue, it was raised that the—A definition which was propounded by the Council of State Governments, was the following: "That an injury means any harmful change in the human organism arising out of and in the course of employment, but does not include any communicable disease, unless the risk of contracting such disease is increased by nature of the employment."

There was no effort to reach a consensus as to whether or not this was a proper definition, but it was one suggested by the National Council.

Mr. Kalmykow raised a very crucial point and several other people, that really, when you are talking about definitions, you are getting to the basic point of just what are the parameters of the program and there is considerable disagreement on what the parameters ought to be. I think the overall feeling is that probably it needs to be broader, considerably broader than it has traditionally been, but the exact, perfect definition has not been reached.

Is workers' compensation as a system helping or harming efforts to identify and assist the magnitude of the occupational disease problem?

I think the answer to that is it is probably not helping a great deal due to the fact the overall statistical areas in workers' compensation in this particular area is generally not too good. But, this speaks in gen-

eral to the whole workers' compensation system. That the statistical area needs to be greatly improved, but particularly in the OD area. there is a need for much better statistical information in order to at least, from the perspective of the workers' compensation agency, to be able to assess the magnitude, and at the present time it appears there is not much good hard data.

How and to what extent do State procedures for determining occupational disease compensability result in denial of claims in which the described disease is partially or totally work related? How can this be remedied?

Well, I think that there were several areas that were brought out in which maybe the present process in some States, certainly not every State, may impede the process of occupational disease claims. Some of the old laws that may have restrictive statute of limitations, some of the older laws that may have, still have very restrictive definitional areas of occupational disease, certainly do not lend themselves to the best type of workers' compensation laws.

I think though, it was pointed out that the general area of occupational disease in many of the compensation laws have been greatly improved in recent years and it certainly is not as bad as it was a few years ago.

Is it true as it appears that the burden of proof on causality of occupational disease rests with the claimant? If so, is this where it should be?

I think the answer to that is in most cases it is still with the claimant.

And as to whether or not that is where it should be, I don't think there is a consensus on that.

There is a great deal of discussion about whether or not some type of reasonable presumption needs to be integrated into the system, and I don't think there is a consensus as to actually how those presumptions should be drawn, but I do think there was considerable feeling that if they could be drawn in a fair way, they would have some merit.

What kinds of problems might Federal legislation, to deal comprehensively with handling occupational diseases within workers' compensation, best address?

Again I don't think that with this particular question there was a consensus. There was certainly a presentation of proposed legislation and some comments on it. As to a consensus as to what type problems Federal legislation could best address, I don't think the panel expressed itself, except there was a concern, there was going to be a need for some type of Federal dealing with the problem in certain areas, but as to what type of expression, as to what course it should follow, I don't think there was any sentiment of the panel.

What have been the problems in the use of class legislation, such as the black lung program? What lessons can be drawn regarding possible Federal legislation?

Without trying to detail the comments made about the black lung program, I think, if there is one thing that came through from the discussion related to the black lung program, it is the general area of comment, the conclusion of the general comment, that Congress does react whenever there is a serious problem that is not being dealt with adequately by the present system, as was the case with the black lung situation.

And so, if there is a lesson to be learned, and it does bear very much on the many diseases discussed in the panel since we began, where there is a great deal of problem in the area of causation, that if we do not try to find some rational approach, some sound approach for dealing with the occupational disease area, that I think we can very well expect Congress may once again, deal with the issue in somewhat similar fashion or in some fashion very much related to the black lung approach.

What kinds of administrative structures, systems, and procedures are needed in determining causality?

We have had some suggestions on that. I don't think any one is particularly conclusive. I think that certainly the idea of using medical boards was one that was suggested. The idea of using specific expert panels dealing with critical diseases was also one that was suggested, and then blends of these.

So, I think in the occupational disease area, there is not any one particular program suggested that was conclusive. The ones that were suggested were generally in the area of the ones in use, and probably are the ones that have to be used based on present expertise.

Those were the issues involved, and at this time I would like to turn the program over to Dr. Burton who will go into the fourth and final area of the program, program interrelationship and causes.

Dr. BURTON. In the interest of speeding things along here, I think I will dispense with the introductory remarks and go on to the presentations of the papers, and I will simply at stage turn the program over to Professor Halpern and Ron Conley who will be presenting a paper on program to protect workers with occupational disease.

This particular paper relates to one-half the topic that remains to be discussed in program interrelationships. The other half on the economic costs of occupational diseases will be covered in the paper this afternoon and in discussion and we will finish up this afternoon.

Gentlemen.

Dr. HALPERN. On thing I think is relatively clear from what everyone said is that not all occupational disease cases are compensated. And certainly there are many not fully compensated.

There are various reasons for this. We touched on them over and over again. I see no point in going through them once again.

Given the circumstance and in effect we have the situation that is very much like a case where there is a workers' compensation system without an occupational component. That is, if there are people who have legitimate occupational diseases and who are not compensated, we have a workers' comp law that does not include an occupational disease component. It is very clear.

We can guess what would happen to these people who are not currently compensated.

If there were no—we know—we can guess what will happen to these people and from what happens to these people we can guess what would happen to the population in general if there were no O.D. component to workers' compensation.

What does happen? Well, we don't know for sure, but we know there are a variety of public and private programs that are available to all individuals. Public programs are available to all individuals; private programs are available to a large number of individuals.

Among the private programs are private insurance systems that are operated by employees. Many employees have private insurance programs. In these situations, they vary from cases where employees contribute to the insurance, to cases where employees do not contribute to the insurance, and—but the insurance is available—a large number of employees have some amount of this kind of insurance. Medical, disability, et cetera. There is a wide variety of these private programs that employees either contribute to or are provided by the employer. Those are the private programs.

In the public sector there are a wide variety of additional programs. There are income maintenance programs, including public assistance, social security, and several others. There is a considerable possibility that there will be other programs. And, there have been a lot of talk and the beginning of some action about programs that would maintain a minimum guaranteed income.

There are other public programs in the medical area such as medicare. Again a public program. And in fact, under most circumstances, there are, for most individuals, available free medical care situations through locally supported hospitals.

In addition to these income maintenance programs and medical programs there are rehabilitation programs, all of which are available free. You don't have to demonstrate that you have obtained, received or been injured on the job or have an occupational disease to walk into a public hospital. You don't have to do anything to get vocational rehabilitation. These things are available.

The question is just how good are these things? These alternative things that are currently available.

Are public supported general hospitals as good as other hospitals where one can go and pay for service?

Well, that varies tremendously from municipality to municipality. There is that issue.

The same issue exists with respect to income maintenance. If you put all of the public and private programs together, a serious issue is raised as to whether or not there are gaps and inadequacies that are currently available in and by public and private programs.

That issue is currently unresolved. The task force is working on it. It is right now to say with any degree of certainty whether or not there are gaps, although there probably are. Whether or not the quality of coverage is good or probably isn't as good as if they were paying for it themselves, and whether or not the amount of income maintenance currently available is adequate.

There is no definite hard proof, but you can make some pretty good guesses. One of the guesses and this is probably more than a guess, is that in order to become available for public assistance you have to be practicably destitute. I would consider that to be a situation where there is a gap.

Now, there are probably many other gaps. Again, there is not a great deal of data yet available to specify completely all of these gaps and just how bad the situation really is.

If there is no such—or to be no such thing as an occupational disease compensation, then I think it is possible to conclude—maybe not reasonable—but possible to conclude one would have to be virtually indigent to make use of public programs to the fullest possible extent.

And in addition to being practically indigent in order to make use of the public programs, the public programs are frequently both economically and socially somewhat demeaning.

So, I think there is a real problem there, and this is in the absence of occupational disease compensation.

Taking it one step further. Suppose there is no occupational disease component of workers' compensation. And, as things turn out, there is no replacement program. That is, occupational disease components do not exist. There is no Federal or local program on occupational diseases. Nothing exists and nothing will exist. What does one do in those kinds of cases? And I am taking a really extreme point of view and saying what the situation would be like.

One thing that might help, if nothing is done whatsoever—right now—one thing that might help is to inform the employee of all known and likely risks involved in the employment. If that is done, then, perhaps, although I doubt it, but perhaps, free market economy would take over. Salaries for high risk occupations would rise and that could, in effect, be one form of compensation.

OK. Frankly, I doubt that would happen because I don't think that many people have that much choice very often about where they work.

Now, occupational diseases have cost—the question is—these costs are both economic and social—the question is what are these costs and who should bear them?

The fact somebody is bearing them now is very clear. It is being borne by the public sector and it is being borne by individuals. And specifying the exact amount of the cost, the nature of the cost, and who these costs should be borne by, is an issue, I think, that has to be dealt with, and I will turn it over to Ron to deal with that.

Mr. CONLEY. The principal issue with respect to workers' compensation and occupational disease, as I mentioned earlier, is whether or not we can indeed find a way to determine in what degree the disease should be regarded as occupational and, therefore, compensated.

And this process of determination is complicated with long-latency periods, because of interaction problems, because of enormous variables to be found, and because of the wide scope of the number of toxic substances that can in fact cause disease.

The main rationale for this conference was to see if we can add additional information or find ways we can indeed determine causability. And, I have to say frankly, I haven't been encouraged by what we have heard here in the last 2 days. I don't think we really have advanced ourselves further down the line of saying of the 10 million people we think suffer from occupational disease, we can in fact determine whether any significant number of these diseases were in fact due to an occupational exposure.

Apparently direct medical evidence is virtually impossible—that is you are not going to find a one to one relationship. Here is a virus, here is a bacteria, and this caused the disease—so you know. What in effect we have are associations. There are periods of employment—there are toxic substances—they are known—there is an increase in the incidents of prevalence of the disease in question, and we can infer from this increased incidence that—you know—the occupational exposure being the one difference between that particular population group and the population, that it was indeed due to the occupational exposure. And

this leads us to the really second mechanism we might have to determine whether or not a particular disease is compensable, and that is by the use of presumption.

It is in effect what Dr. Mancuso was making a plea for earlier. I hope he is right. I hope it can be done. I will say though, I have for a year and a half been asking for the evidence that can indeed show the probability of contracting a particular disease given a particular exposure, and for the last year and a half I am been consistently told it is immoral to do this, as well as impossible. I hope I am wrong.

Dr. MANCUSO. Depending on who you talk to, I will be glad to have you come over.

Mr. CONLEY. In fact, I think I will.

We have to understand what presumptions do. They in effect say there is an excess prevalence of a disease for a given occupational exposure. Now, suppose that the excess prevalence was on the order of two to one, and you assume, therefore, everyone in that particular occupation should be compensated if they obtain that, get that particular disease. This means you are compensating one-half of the people for a disease when, in fact, they would have obtained it even in the absence of the occupational exposure.

If you are in a situation where the excess prevalence is 5 times the average or 10 times the average, then the number of people in the system is on the order of 20 or 10 percent of the total and people don't get excited about that. We don't mind that kind of error ratio.

But, if I understand occupational diseases, and my understanding isn't too great, but it is just a vast complicated system where you are going to reach down into a situation where the prevalence rate is ten percent above or 20 percent above. And, when you get down to that level, what you see is a disease, you see people working in a particular occupation. And how can you tell who would have gotten the disease had they not worked in that particular occupation? There is apparently no way to do it, if you set up a presumption, you are including a vast number of people who would have gotten the disease in any event, in order to cover a few people for whom it is truly occupational. If you don't set up the presumption, you do a grave injustice to the people who have the disease that is truly occupational in origin.

I really don't know what the answer to this is—unfortunately. Except, it seems to me if you are to cover all occupational diseases, literally you have to find a particular system to cover an enormous number of medical conditions suffered by workers. It is going to be fairly extensive. And, I really doubt if workers' compensation as a system is going to reach that goal in the near future.

We don't have the knowledge base, and even determining what the excess prevalence is for the various toxic substances, and even if we had that knowledge base. I am not sure how acceptable sweeping in so many cases of nonoccupational disease would be.

Therefore, we may want to consider alternatives in terms of providing medical care to people with disease and occupational disease. But, one thing is clear, whether it is done under workers' compensation or some other mechanism, the services must be provided.

And now we are talking about the means. What are the alternatives? Let's think about four.

One is to keep the present system. Now under the present set of programs in this country nobody—you know—let me put it this way—what happens to a person who has a disease who is a worker? The disease may be occupational but not covered by workers' compensation. If he is very lucky, he works for a plant that has a good fringe benefit program, and his medical costs are paid by accident and health insurance. He might get an early retirement pension of disability and is almost as well off as if he had been brought under workers' compensation. That is the best situation.

The next step down is most workers who are not brought under workers' compensation will probably be brought under social security disability retirement. We don't know how many, but most of them would be eligible for that kind of benefit as a matter of right.

Now, let's take the next step down. A worker who, because he didn't happen to work in a covered industry or because he was recently attached to the labor force, or because he doesn't meet the current work provisions of social security. For some reason he doesn't qualify for social security. What happens to him? Well, he can go under a supplemental security income administered by social security once he proves himself indigent. That is a program based on need, and you literally have to prove yourself very poor.

If you need medical attention, and there are programs, there is medicaid, but again you have to prove yourself indigent. This is one system that we will not let people die or starve, but we may force them to suffer degradation, and we may force them down to the poverty level before they are provided the services. We can maintain them or we can look for alternatives.

What is another type of alternative? The white paper of workers' compensation mandated the Task Force to consider the possibility of combining accident and health insurance along with workers' compensation in terms of industrial coverage. Actually, this is very appealing and de facto. I presume many large companies in effect do this. Then, there is no question of whether occupational or nonoccupational, a worker who has the disease is covered. If there is an income replacement provision, he is covered for that, too.

At one time I thought, gee, it was a nice way out. But, my problem is, if you have a long latency, and the disease strikes out after the worker left the place of employment, then you are right back where you have to prove a relationship to that occupation and back in litigation and that creates a problem.

Another alternative and one that blows hot and cold and right now some people don't think is in the cards, but I am a little less pessimistic—is a system of national health insurance and a national system of wage replacement. It doesn't have to mean the end of workers' compensation, because the logic of costing out the industrial injury or disease, when it can be shown through the workplace, that is so very valid, and national health insurance can be set up so that if a worker is ill or injured, then medical care is immediately provided, and if it turns out to be due to occupational causes, then the employer is responsible for that cost of the medical care. There is no reason why it can't happen.

How viable this is in alternative, again, I can't tell. I have had some arguments and last night I had one. Someone said, what will I do

about resource allocation because if you put a zero price on medical care, people overutilize it. Again, I don't know what the answer is. There are many different ways of having national health insurance—I should say complete prepaid coverage for workers. The Government is pushing one right now through HMO, Health Maintenance Organization, which in effect puts a zero price on medical care.

OK, there is a final alternative that has been mentioned here this morning and last night that concerns me somewhat. And that is having other special purpose programs like the black lung program. Yesterday Dr. Burton mentioned the possibility of doing this for heart cases. I didn't put that in my paper because I am somewhat horrified by the prospect. Not about the black lung program—I think it is a very good program and a necessary program to meet a very clear and demonstrated need. But, then you begin to set up all kinds of semi-concentrated programs; one for heart, one for cancer, and for a very specific purpose, and you begin to miss the needs of the workers.

When people have one disease other diseases begin to develop very rapidly. For example, in miners, you start off with respiratory conditions and it often turns into cancer, and it often turns into heart disease. We have a very categorical program and you will have people going to two, three—what kind of coordination problems do you have? It is a very fragmented approach that leads to additional bureaucratic problems, and working in a bureaucracy, I would prefer not seeing this kind of approach develop.

I would like to make one final comment and I am not going to—well, I will just mention it briefly, and that is on the whole question of cost. The question: Can we afford to cover occupational disease? That is, will it be too great a burden on this society if we somehow put it into workers' compensation.

Now, from a social standpoint—maybe not an employee's standpoint—but a social standpoint, the cost of an illness or injury occurs when a worker is injured or diseased. When he becomes disabled, unable to work, sustains medical care. Everything after that is sort of arguing about who should pay the cost.

The only way industry would really be unfairly affected, if the cost of O.D. were related back to industry, would be if they began to pay the cost of many diseases that were not occupational in origin.

This will be more full elaborated on in the paper to follow us. I think it is worth emphasizing that you are concerned about the cost of disease that is occupational in origin. And there is only one way to reduce the cost and it is not through denying workers' compensation benefits; it is by prevention and by rehabilitation and no other way.

Dr. BURTON. We will now call on Tony Mazzocchi from the Oil and Chemical Workers. Tony.

Mr. MAZZOCCHI. I think the only value I can be to a conference such as this is to convey the perceptions and attitudes of the people we represent. These are not my own principles or my own attitudes. They grow out of a sum total of our experience with the problem of occupational disease and also a sense of indignation which sometimes grows out of the frustration we confront.

This conference provides an opportunity for me to say some of the things that have to be introduced. Some have been said by other

panelists and some must be said by me. Just a few brief comments on the paper.

The paper talks about duality of benefits. Our experience about duality of benefits, about other programs, merely causes us to be indignant simply because when we see what benefits are available to a diseased worker we find them grossly inadequate. The tripling of benefits that are alluded to in the paper are not in evidence in the experience of the industry, and if they do occur, the sum totals are normally grossly inadequate.

Dr. Halpern answered his own question about the question of when a worker is entitled to receive these particular benefits. Now, I don't want to go into detail about that aspect of the paper, and will merely deal with the summary.

Of course someone pays for occupational disease. At the present moment the worker pays for occupational disease, not only from an economic standpoint, but also in loss of life and he dies many times in a way the economic cost is really negligible. He dies rapidly sometimes. Sometimes he doesn't, but he lives a fairly miserable existence up until the point he does die.

Now, the point made throughout the conference I want to reiterate is that cases are not finding their way into the system. That the figures cited stand by themselves and our experience is, we think, we are in the midst of an occupational disease epidemic. It is empirical, the methods that we arrived at this conclusion, plus developing data from various sources. It is not organized. I think a number of us went into why that data is not organized and that we have really stumbled along into the situation that we are now in today.

Our awareness, the labor union and workers' awareness is the result of the emerging environmental movement. We made a number of necessary correlations as a result of a great deal of information that was fed into the public dialog as a result of the movement of environmentalists. As a result of this we were catapulted into some sort of action. Now, it wasn't a cascading action such as black lung.

Black lung came about because there was a black lung movement. And there will be a rainbow lung movement if recognition of this problem is not dealt with. And there will be an occupational carcinoma movement unless this situation is dealt with.

Occupational disease will be dealt with in some form, whether this form or another form, it certainly will be confronted.

I would say my value is in expressing values and perceptions. That is what I witness daily in the work place and I convey here.

The charge before this Commission is what do we do with workers' compensation? I do think there are other programs that do have to be enlarged to deal with the enormity of the problem. I think the dialog is that would be held in a different forum but for the purpose of this meeting I would like to talk about what workers' compensation should be doing and what it can do.

The one presumption I think that has to be dismissed in the presumption that you can't do anything because the job is so enormous. I think that presumption will be dispelled once you get cases into the system, and then the argument takes place whether you can relate the disease to the occupation. I think Dr. Mancuso's comments on that

subject will hold up. That test, before one can draw conclusions upon that, you have to experience it. We are not experiencing it because the system at present is designed to exclude people from coming in and judgments being made.

I stated and others stated there are certain prerequisites that must exist before we get the cases into the system. The right to know is essential. I mentioned that. There are mechanisms on the right to know. You can inform the employee what they are confronted with and they will react to this new awareness, and they will be able to reach out for resources if they become aware and we develop resources.

For instance, I think it is necessary to have a public defender system in workers' compensation. A public defender system that is made up with a number of components: industrial hygiene, occupational medicine, legal.

The type of team that can properly represent people to find their way into the system. Labor unions can't be expected to do this. They represent an infinitesimal part of the work force—less than 20 percent actually. There are vast areas in the country where there isn't representation. And also vast areas of the country where there is not even medical. The hospitals that Dr. Halpern alluded to, don't exist in many areas. We have many communities with one doctor treating a very large work population.

So, it is necessary, once people know of the problem and find their way into the system, that there is the ability to articulate the relationship between occupational causality and the resultant disease and many arguments can develop whether all these multiple factors make it impossible to deal with.

I think if the system allows the case to come before it, that question will be resolved. If not, there will be other forums in which we will have—the question will be addressed.

There are a number of problems developing that the commission should be aware of. First of all I want to reemphasize there is a law in this land that says a worker shall suffer no impairment as a result of his work experience. That is the charge of the Occupational Safety and Health Act. It is no longer debatable. As a result of a person's lifetime of work, there shall be no impairment. No partial impairment. No impairment. The law requires the workplace to be free of all hazards. That is no longer debatable. One can institute a complaint if there are hazards in that particular workplace.

The question of hazard pay for hazardous work—I thought that was a theory that was discarded many years ago. Any labor union official who attempts to negotiate years of someone's life away has no business being in the labor movement or representing people. How do you bargain over whether a worker becomes impotent at the age 30 or age 75? How do you bargain over the very quality of life as a result of the work experience? Or how do you bargain over the fact a worker would die 15 years ahead of time? I would hope that concept doesn't find its way in any other forum. I thought we put that away a long time ago.

First of all we are talking about things many times we don't know exist, and only know they exist as a result of the body count that we discussed.

So, essentially workers' compensation is a component of a total system that must address itself to the question of occupational disease, and

there is a preventive component to it because if the cases come into the system and the costs become appreciable, you can't dismiss it and say we shouldn't let it come into the system because the cost is appreciable; you ought to address the reasons why the cost is appreciable and try to prevent the problem from occurring in the first place.

And if the problem is not preventable, well, society has to make some decision. It may be what is being produced shouldn't be produced; or the manner in which it is being produced should be changed. But, before society can make that decision they have to be aware of the problem. Workers' compensation is a component of this whole decision-making process.

Workers do get damaged; workers don't find their way into the system; workers should be compensated if they are damaged; they should be compensated not in a manner which makes the remainder of their life miserable—they should be adequately compensated for the damage done to them by those who did the damage. That is the responsibility of the system; that is the responsibility of industry.

The responsibility of the workers' compensation system, in my opinion, is to identify who does what to whom, and then to calculate the costs and assess that particular cost. If it does only that, it will have performed a valuable service.

I think the development of a new Workers' Compensation Act—there will be a great deal said about how the system should be administered, and I will not address my remarks to that.

And uniformity of benefits, so we don't have industry moving from one spot to another where it is cheaper to disease someone in one spot than another. It is a dimension we have to deal with in our everyday experience.

So, I think the cost of the way costs are presently socialized, we must address. The fact that industry does operate in a fashion where someone may calculate a number of disease victims—and I can point out the fact the asbestos industry in certain areas of the country do calculate this; they pay over a million dollars in workers' compensation claims in just around the Johns-Manville plant in Manville, N.J. But, there is a cost there that goes beyond the \$1 million in the number of diseased victims in that particular industry.

Someone calculated that and said OK, this is worth it. I don't think the system can continue that will allow that type of computation. You can't do it because you are not preventing what is occurring to the worker in the first instance. So, I think one has to take in that component and also measure that if a worker is being injured that the redressing of the problem, that there be a monetary component that acts as a penalty factor in a situation where there has been a previous work problem.

In the first instance, we have to develop an innovative approach to the whole question of occupational disease prevalence and a question of assessing greater costs in one instance than others because of the damage. That occurs to me is one that the Commission should consider.

In our system today the benefits are being paid for by reason of the fact we are negotiating part of our wages. The fact we don't take money out of our pocket and pay by direct premium, we are paying for the increased utilization of that particular program.

What I am saying is that that social insurance program is now bursting at the seams. The costs of increased medical costs are real. The fact the system can't deal with those people coming into it as a result of being occupationally diseased—that is a double cost on the part of the employee.

As I say, this is resulting in and worth looking at the entire situation in a manner that is on the brink of cascading. There are those of us looking at the National Cancer Atlas and I would suggest when one looks at that National Cancer Atlas it is no secret to us that yes, there is the possibility in communities relative to industrial exposure. In our own perception that grows out of our visiting the scientific community, and for instance, I with Dr. Berkowitz made many site visits to the National Cancer Institute. And we discussed carcinoma with prime investigators. When occupational carcinoma was mentioned everyone's mouth opened up and dropped and there was no response. I found it the rule all throughout the United States and it was indicated to me that the people we are depending upon to do something about the problem we are confronting, don't understand the problem in the first instance, and they don't understand it in the first instance because it is not visible. They are dealing with carcinoma as an act of God.

So I am suggesting, it is essential that we perceive there is an epidemic of occupational disease. That two, the system has not allowed it to enter. Therefore, public dialog has not developed. And that the fact, the matter most discussed at this conference is how do we make an award based on what happens to an individual is a presumption that should be dismissed. You ought to allow the case to come before the system, and I think that situation is going to resolve itself on the next go around.

I think our immediate goal is to get cases into the system because of all the recommendations made by the panelists. I completely agree with Dr. Mancuso's approach on the predicates. Those predicates must be put in place before the cases come into the system.

Dr. BURTON. Mr. Schubert?

Mr. SCHUBERT. In many ways Tony's presentation has been one of the most optimistic and a frank way of saying the system can do a lot more if we get the cases into it.

The one specific suggestion was a kind of public defender or legal aid approach for workers' compensation. Putting that aside for just a moment, I am wondering for the purposes of trying to reach some judgment, a specific judgment out of the conference, what other specific—based on your very valuable experience in a very practical sense in working with claims—what specific changes would you make to insure getting more of these cases into the system and developing of a kind of case law that will make the system more valid?

Mr. MAZZOCCHI. I will have to refer back to Dr. Mancuso's remarks, and those are, in order to get it into the system people have to become aware there is an association between what happened to them and the work experience. I would refer you to Dr. Mancuso's remarks on information. What happens to that information. All the appropriate linkages between the groups that he discussed and the fact that workers should have control. Certainly the medical component and industrial hygiene component. I think these are absolutely essential. If that doesn't happen, of course, the cases don't get into the system.

But, if it is required that in every workplace there be full disclosure of every substance that one works with, the amount of that substance that might be in the workplace environment in any given moment, and the question of adequate medical surveillance that is controlled by the worker—because you know, Dick, under the Occupational Safety and Health Act, there is a new component that would put cases into the system, that says if there is an abnormality growing out of the exposure. For instance, vinyl chloride. You may have a slightly enlarged spleen, and the employer must remove that person from exposure. Which means, in many instances, a removing of the individual from a job into a lower graded job or into no job. So that person must be compensated for that particular movement.

Now, the situation is, unless we know we can get relevant medical surveillance, and of course, that cost must be borne by the employer. Our scrutiny of vinyl chloride workers—of the 600 we examined, it took 5 hours apiece per worker; it took 25 people as a medical team working 4 solid days, 10 hours a day; it took about 75 human volunteers and the physical facilities of the union hall to properly examine those workers. The cost of the examinations, one can only guess at. This was a protocol design to look at the damage that might grow out of the very complex operation.

I think this situation is essential before the case comes in. Disclosure. The right to know. And after all—and I do want to make this point—there is no monitoring in the industrial workplace. Now, one will say in my plant we monitor. I challenge anyone in industry to allow a team of competent investigators in without notice to see whether there is complete monitoring of that work environment. Some factories are better than others. But, for the most part, there is a complete absence of monitoring today. Complete. Some industries have some monitoring.

So, essentially we work in an environment of not knowing—even if we know the substance—there is no method of measuring it. That is essential.

Dr. BURTON. Could I ask you a question? You, in the course of your remarks, indicated that the cost of these programs really come out of the workers' pockets when you sit down to negotiate insurance benefits—that is part of the package, and the ultimate cost is borne by the workers, and you are also obviously saying a lot of expensive things should be done, such as higher benefits, preventive efforts, medical supervision, and so on. Let me put those two together.

Are you really willing to say the employees, if they knew what the implications are, are willing to pay those costs themselves? In other words, do workers now really understand what you said, namely that the cost of an occupational disease program is going to be borne by them?

Mr. MAZZOCCHI. I am saying that we are paying the cost of occupational disease. Prevention is the responsibility of industry. That is the cost of doing business.

I never worked in a plant where a bathroom wasn't provided or a cafeteria wasn't provided. I mean, that is a cost of doing business. There is nothing socially productive about those two items, but they are necessary in order for workers to remain in that plant and produce items.

Part of the production of that item is also a safe working environment, and a worker shouldn't be expected to pay for that component.

It all comes out in the wash—somebody down the line—it comes out in the price of a product—it comes out of money out of our pocket—you are an economist; you know someone pays.

But, at the moment, we are not essentially saying that the cost of putting in a monitoring system—the cost of containment—is part of the cost of doing business.

If free enterprise is either to be free or very enterprising they should do this as a condition of employment. And I am for the use permit system. I said that. No employee should be allowed to operate without meeting certain basic prerequisites. That should be essential.

Dr. BURTON. You are saying this both ways. You are saying that employers should bear the cost and yet in a slightly different context you are saying really employees are absorbing the cost of social insurance programs. And what I'm saying to you is, I am not sure you are really facing up to the implications of your own remarks.

Are employees willing to pay these prevention costs if in fact, as an economist might argue, those costs are actually shifted back to the worker?

Mr. MAZZOCCHI. I am not here prepared to go into all the shortcomings of society. The fact of the matter is, when I negotiate a contract, I sit around a bargaining table and we are going to be bargaining for cents an hour based on all the economic realities of that particular industry.

What I am essentially saying is that one component that we are now willing to dismiss is saying we want to get industry off their dole—that welfare program—that is a welfare program based on years of our life—that we have been subsidizing—that industry is saying is a cost of doing business—must include these prevention programs. Certainly industry is going to pass the cost on to society at large. We are saying, yes, of course, it ultimately happens.

Dr. BURTON. The point is, maybe you are passing it back to the worker in the form of lower wages?

Mr. MAZZOCCHI. I think you will have to leave it to us to make that economic determination. There are picket lines and et cetera to determine whether the cost is being passed back.

Chairman BUNN. Mr. Mazzocchi—I think it has come through rather clearly during the course of the several days of testimony or several days of discussion that we have had, that one of the key problems, which you have just alluded to and brought out in Dr. Mancuso's paper, is getting cases into the system. That is a very critical thing that probably goes to a great extent beyond the workers' compensation agencies themselves. It is critical to somehow or other get them to the point the agencies can deal with them. So, I think I personally would tend to agree with you.

The next thing that is of concern, and I think in the course of the discussions we have had, we have discussed it, but I would like to see what your comment is.

Once the case does get into the system, somebody does file a claim, and that is when you get to the problem of medical causation and determination. Someone has filed a claim and then you get into the dilemma that took place before with a medical board or a hearing, where at that point it begins to break down again. You have somebody

oriented to the point he knows he is exposed, he has come down with a particular disease, he feels there is a workers' compensation claim, and he files a claim. It comes into the system, and then at that point it begins to run into trouble again, and that is the medical profession has a problem with addressing itself to causality.

Now, we heard several ideas expressed along the lines of presumption, along the lines of standards, and different ideas to get the system, once it is into the system, to go ahead and handle the case. And then, my question to you is, do you have thoughts on what are the best ways to deal with that particular problem?

Mr. MAZZOCCHI. What I am saying is we ought to cross that bridge when we come to it.

You know, one thing that would have well served this committee would have been to roll out a few actual cases and let us bring in the type of scientific expertise that we think would have been convincing in demonstrating that disease was caused by that particular occupation.

I am suggesting the barriers at the present moment—is you are anticipating the enormity of a problem—that is going to be appreciable—I recognize—but, not as appreciable as being put forth here. I am saying, you get it into the system and certainly if you do the other things we talked about, I think that question will resolve itself.

Chairman BUNN. Let me react to that as a former head of a State compensation system. I tend to think you are right. That probably we may be to some extent over dramatizing whether or not it can be dealt with once it is into the system. But, I do think it is a problem. I am not kicking it back to you for you to try and give me a definite answer.

I think that is one of the rather serious problems in the chain of events that we need to address, and I think are going to have to address, because I think this is one of the problems of the black lung experience, and I suppose that, of course, we will have to go back and review the entire record of the various comments made by the medical profession and all of the other people on the panel, but, I guess I tend not to be as optimistic as you are, apparently, about the fact if you have the best medical presentation you will overcome that barrier.

I really, it seems to me it has come through from the medical profession, through the course of various proceedings, that this is a serious problem, and I tend to think this is factor in the overall chain of things that is causing at least a certain percentage of the cases, perhaps a high percentage of the cases, not to ultimately reach a satisfactory conclusion.

Mr. MAZZOCCHI. First of all, what are your options. I think one must deal with that.

Second, I was involved in the full-employment act for lawyers called the Taft-Hartley, Landrum-Griffin Act. That created an awful lot of jobs for lawyers. And I am now involved in a movement I hope will be the full-employment act for industrial hygienists and occupational physicians.

As a result of getting cases into the system, we are going to have to go back and develop resources to deal with that. And I am saying we can't develop those resources and we can't develop our skills unless we get into that particular principle. Because, there aren't any options.

I have no great illusions about what is going to happen. I have lived long enough to know this isn't going to be the total answer. But, it is one step forward. I think what will come out of those confrontations will be a demand to do something about what caused the problem you are dealing with in the first place.

Chairman BUNN. Let me make sure. I think I do understand you now. You are saying once you get over the hurdle of getting the case into the system, the problems that come from getting the case into the system will create the solution to the problems we are talking about.

Is that what you are saying?

Mr. MAZZOCCHI. It is going to create its own dynamics that will require other moves to deal with the problem.

Chairman BUNN. All right. I think I hear you now.

Dr. BURTON. I will reassert the fact the topic right now that we are talking about is program interrelationships. I would like to see if we could get some questions and comments on that.

Dr. ASHFORD. Program interrelationships are not able to be understood except in the context of people who have vested interests in those programs and are affected by them. And I will try and stick to the mandate and be as brief as possible.

The thing that we are seeing and they are mixed up and our task is to try and make the Task Force identify the right questions that in fact might come up with some sensible answers. And I see four major concerns which highlight four different kinds of conflicts that I beg you to distinguish in attempting to carry out that mandate.

The first is the concern of the scientists in the very beginning. It is, what is the case of occupational disease, and I think we shouldn't be misled by the tremendous appearance of disagreement as to causality and the extent of occupational disease. I think there is much more agreement than they meant to show us by their remarks.

It is possible to create a national occupatology registry and to rely on scientific expedience that exists as a central source for people that deal with workers' compensation and I think they should underscore the correctness of that statement.

The second concern has to do with just that which occurs when anybody's self-interest—when anybody's ox is gored. The industry is going to speak from its point of view; labor from its point of view; and the professionals from their point of view in doing their own kind of research.

And let's distinguish that from the third concern which is a concern having to do with fairness, and I would beg the Commission to address that issue and not dodge it.

There are a number of kinds of fairness. One has to do with fairness that in each case of a certain individual, a deserving individual that is denied compensation.

The second has to do with the unfairness, perhaps, of hitting a particular employer for something he may not have been responsible for. But, remember, ultimately since insurance goes to a risk spreading operation, you are not going to hit the individual or the employer, you are going to hit the individual industry.

Remember, too, those industries that pollute the general environment are generally those that are unsafe within the factory. And if

you are upset with overcompensation, remember undercompensation on the environmental end may go to the issue of fairness.

And I am not saying what is fair. I am saying to address the issue of fairness the Commission should do this.

You will hear this afternoon the cost of occupational diseases are also borne by the firms in terms of reduced productivity—

The other issue has to do with one John Burton raised and the issue of the workers paying ultimately for the occupational disease. Let's remember that the worker may not be able to properly assess the value of their health and they are up against the wall and you may have to take it off the wages. Tony says he will handle that when the time comes. But maybe it would be helpful, if even some of the burden were passed to the workers in terms of paying it out of their wages. They might be getting very good value for their money. Let's not be too disturbed about that issue.

And finally the last concern. The fourth area is something absolutely critical to reach the other issues and that is access to the system of open information.

I say these things not to preach but to try and separate four kinds of concerns because they are critical.

DR. BURTON. Thank you for your comments on program interrelationship.

MS. ROBINSON. Mr. Mazzocchi, I am still dealing with definitions. And one of the points that I think you made was that we are in the midst of an occupational disease epidemic. You also have said we have a problem getting people into the system. I am sure there are some people here that think we don't need to worry about changing the system particularly because we haven't proven the problem is that big.

And I am wondering, within that context, how are you defining occupational disease epidemic? What evidence do you have that that in fact exists?

MR. MAZZOCCHI. I go back to Ashford's figures that are based on figures we all know that of the 100,000 workers who die each year by occupationally induced diseases—and that is contained in the President's report and that is an appreciable number of people. That is more than were killed in any one war fought in this country's history. And that doesn't even take into account those people who have the disease and don't die.

I think—and also what we observe in a workplace that I can't put into any tangible form. I mean, that is part of our perception that I talked about, and that is part of our growing indignation. I think there is sufficient written about the occupational health epidemic. It is contained in various health reports—The National Cancer Institute, World Health Organization.

In our recent experience with vinyl chloride, which showed that a third of the deaths in one plant occurred as a result of their exposure to vinyl chloride, this was cancer due to vinyl chloride, three of the deaths were caused by angiosarcoma of the liver. Now, what is the incidence of angiosarcoma of the liver. One in 78,000 deaths or some such astronomical figure. And we have three out of eight deaths with that particular disease. And we are saying that we have just looked at the tip of the iceberg.

We are also aware that we entered the age of synthetics 30 years ago, 35-years ago, and are beginning to see in the synthetic industry the occupational deaths, related deaths. We see weekly growing out of the National Cancer Institute, practically cancer alerts based on what we work with, synthetics.

So, our perceptions are sharpened by this information that is coming in, and I would agree in an uncorrelated fashion, and we talked about that, and I mentioned the fact there is a need for the registries called for Dr. Mancuso and myself, and certainly I don't think one can deny Ashford's figures. And the President of the United States who revealed those figures in his message to Congress.

Dr. BURTON. Are those President Nixon's figures you are relying on here?

Mr. MAZZOCCHI. His surrogates.

Dr. LASSITER. I have written my comments down so I can be as brief as possible.

The need for workers' compensation legislation for occupational disease is tantamount to an admission by society of a failure to provide adequate protection for workers exposed to toxic substances and chemical agencies in the work place. To the extent that such legislation must increase in both cost and coverage in the future in terms of occupational disease, the significance of the activities of OSHA and NIOSH must be scrutinized closely. These agencies must provide the first line of defense against recognized occupational disease.

If they truly fulfill the legislative mandate for prevention of occupational disease, then the question of workers' compensation coverage is going to be moot. To the extent workers' compensation legislation is to be used as means to prevent occupational disease, it must be closely coordinated in the future with the programs of both OSHA and NIOSH.

Within the next several years OSHA will promulgate specific medical surveillance requirements for over three hundred toxic substances and physical agents that congregate in the workplace. Management provisions will be required to certify, based on the results of medical examinations and tests which are part of such medical surveillance requirements, before the exposed employee may be continued to be exposed in the workplace to these agents.

One situation which is bound to be precipitated by these regulations concerns the point at which harmful aberrations of medical preventive findings will be considered indications of the presence of disease and in some cases new occupational disease.

I only add to this the fact, in the area of occupational cancer, that the third national cancer survey, which was completed 1969 through 1971, involving 10 percent of the U.S. population, had as a portion of the survey a smaller statistically reliable factor that concerned questions of occupational exposure. That data is presently being completed in the Cancer Institute and the primary data I have seen has risk ratios by occupation and industry by specific site. Such as if they were standardized, should be able to give some indication of the number of excess cancers by specific site by occupation and industry throughout the United States.

Dr. COLLIGNON. I would like to respond to Nick, except that he apparently has gone.

The point has been obviously made that there is occupational disease and it is extensive. And Dr. Mancuso made the point there is medical evidence. But, I think what Dr. Conley was trying to make was the point that it went somewhat further than that. Particularly, while there may be medical evidence it tends to be judged, it tends to be determined from ecological evidence, risk factors, and so on. Which leaves the problem there does not appear to be a way of defining which of a large number of individuals suffers from a given disease, that tend to be those with clear occupational relationships.

Such that covering them under the workers' compensation program means there will be a large carrying cost and risk factor, too. One is carrying perhaps 50 percent of the cost for individuals for whom a disease was not necessarily occupational.

While Nick—in discussing fairness, I think amidst the employer's perspective one is not simply asking him to fairly bear the cost of a disease his own production decisions involve, but also the extra costs, and that can be very large, a very large carrying cost.

I think Dr. Halpern's questioning of Doctor Mancuso earlier was aimed at, if there are so many occupational diseases with very clear-cut standards of determining causality of the kind that could go into the workers' compensation system, let's hear about them. In a way, we haven't really identified them in this Conference. I think that is what Dr. Conley has been concerned about.

The issue is not how does one handle the occupational disease problem. It is, does one do it through the workers' compensation system. I think there is a very large area involved and great tendency of ducking that question, which I think the paper just presented tries to bring fairly into focus.

Dr. BURTON. Taking off from Fred's comments here, a question which I would like to come back after the lunch break and use as a basis for discussion—it is a take-off from the question posed, and that is: on what basis and along what lines might sharing the occupational disease problem with other programs be considered? What are the ramifications of these alternatives?

Let me, one the basis of what happened the last few days, make that a somewhat more complicated question and ask:

Are there different sharing arrangements that are appropriate for the different kinds of diseases we are talking about?

Perhaps oversimplified, you might take the class of diseases where there is little argument that they are occupational in nature; that they are readily identifiable—I don't know how many there are—of course, that is one of the controversies—but at least at one end of the spectrum conceptually there are clear occupational diseases.

Presumably at the other end of the spectrum there are some diseases that are pretty fairly recognized as not being occupational in nature. Birth defect would be the clearest example of that. Although I suppose one should have to be careful—in other words, at the other end of the spectrum, are there diseases that are not occupationally related.

Then, there is this middle ground of disease which appears to involve many, if not most, diseases we talked about. Where there can be multiple factors to give rise to this disease. And among those factors can be environment, hereditary factors, as well as occupational.

And it seems to me in the question of sharing, you really ought to try and ask, do we want a different kind of sharing arrangement for the three classes of disease: purely occupational; purely nonoccupational; and one of mixed origin.

And I don't know the answer. I pose it and I will repose it when you come back. Hopefully this will so intrigue you that no one will leave the place and a lot of plane cancellations will be made on the basis of this fascinating comment.

We will adjourn now and come back in thirty minutes at 1 o'clock. [Whereupon at the hour of 12:30 p.m. the luncheon was taken.]

AFTERNOON SESSION

Dr. BURTON. We have decided many of the issues we are now talking about—in fact the question I posed before lunch—really involve the whole range of issues scheduled to come before the Conference, including material on the cost of occupational disease. Therefore, I am going to make a slight modification in how we proceed this afternoon.

We will go to the occupational disease costing papers, have them presented, have the discussants talk about them, and then once that presentation is over, we will open up the discussion for the general topic of occupational disease, including the important questions such as the sharing arrangement of program interrelationships.

The question of occupational disease seems to me to break down into several components, not all of which we are going to get into today. It is in the first place, a question of what are the costs of occupational diseases, or diseases in general. This is to a certain extent a conceptual problem of how to define cost.

Do you want to confine the cost measurement to loss of earnings? Do you want to include in the definition of cost things such as the value of pain and suffering. Workers' compensation has traditionally confined it to the more labor market phenomena, but obviously there are other legal systems in operation which take a more general look at cost.

After you make a decision on the conceptual aspects of costs, there are some measurement problems. How do you measure the magnitude of the cost of occupational disease? Now, the first broad question of what are the costs of occupational diseases is one we will be looking at in the papers that Messrs. Barth and Collignon will be presenting in a moment.

A second question in the cost area is who bears these costs now? There are substantial costs of occupational diseases, only some of which were borne at the moment through the workers' compensation program; some of which are being borne by the employees themselves; and some are borne by the taxpayer. And this is a question that deserves some attention in terms of the current status of occupational disease cost.

A third question in the cost area is what would be the implications of internalizing all costs of occupational disease within workers' compensation or within some other programs.

That is as at the present time some of the costs of occupational diseases are being borne by workers in the form of reduced earnings; or paying for medical expenses out of their own savings. What would

happen if we now set up a system which made a situation that all costs were directly borne in the workers' compensation premiums.

This has some implications for employer behavior. How would they react to these higher costs. To some extent they may shift it to the consumers; to some extent to the workers in the form of lower earnings, particularly workers represented by a union other than the Chemical Workers.

And the fourth question that is involved in the cost question is to what extent should the cost for occupational disease be reduced? What if we can identify and measure in an unambiguous sense the cost of occupational diseases? There is a question which economists alas are prone to ask as to whether or not it is worth reducing the cost, or putting it another way, to what extent is it worth reducing the cost of occupational diseases.

Now, this is obviously a controversial question to raise for many people, but economists I think are prone to say there are resource costs in terms of improving occupational disease situations. There are alternative uses for those resources. After all, this is a conference which focuses upon occupational diseases, but there is a conference a weekend here dealing with a significant national problem.

And unless we want to confine ourselves to a parochial exercise, we have to in some way or other put the occupational disease problem in some context. And one way of doing this is to compare the benefits of reducing occupational disease; the benefits in the form of reducing lost earnings and reduced medical expenses. Those benefits have to be compared to the expenditures directly or indirectly by workers, employers and society in general, and bringing about this reduction in occupational disease.

I must say, as sort of a rhetorical comment, the notion that the Occupational Safety and Health Act says there should be no impairment in society. If that is a realistic goal or goal you are shooting for would appear to economists as patently absurd.

There is obviously no way you completely can get rid of occupational disease and injury without shutting down industry. And I don't think any of us are willing to bear that cost to have the benefit of no occupational diseases come upon us.

Now, I think I have said enough to stir up some comments and alternative viewpoints, but before I let you have your say at me, however, I want to first go to Professors Barth and Collignon and allow them to make their presentation and Mr. Guy to make his response. Peter.

Dr. BARTH. Some of you may wonder about the format of this presentation—part one and part two. Professor Collignon and I never met each other before 2 days ago. We were asked to prepare a paper jointly without ever having spoken to each other, knowing a great deal about each other's work. We contacted each other on one or two occasions prior to each of us writing the paper. There was some exchange. But, I hope you will forgive the appearance of really two papers snuck in under the guise of one. I can assure you it was not a shotgun wedding involved, but on the other hand it was very much a blind date.

Professor Collignon and I are at a distinct disadvantage in the conference because a number of the subjects covered in our papers in fact

have been discussed earlier. Some directly preceding us and some 2 days ago. What I would like to suggest—what I would with impertinence suggest is that you people read the paper in total because I am going to gloss over very large portions of it.

The first part of my paper raises the question of why do we want cost estimates of occupational disease.

Some of those issues have already been raised. I speculate there are four possible reasons why one may want to generate cost estimates of the combining of costs of occupational disease in the United States in 1976 or 1975.

My feeling is in large measure the reasons deal with policy, that is public policy. It is quite appropriate. On the other hand, it has become clear the implications of those cost figures and how they impinge on public policy are dreadfully unclear.

If we did cost out in the aggregate the cost of occupational disease and came up with a number that was strikingly large, large by anyone's stretch of the imagination, it is unclear whether public reaction through the Congress or legislative process would result in the kind of legislation some of you feel is necessary. That is to say, the reaction that might ensue might be comparable to what occurred in 1935 at the time of the great silicosis scare. That is restrictive legislation; limiting legislation. Legislation we still have 40 years later, but legislation that was created out of fear that the costs dealing with it would be so large they couldn't be dealt with except by special legislation.

On page 5 I spell out, I think, the fairly traditional, fairly colorless framework for evaluating costs of occupational disease as economists would do it. Some of you will have trouble with that. Economists begin with the notion that costs involve resources used. Resource is spending. Resource is expended. We don't spend too much time in the paper or in our own work typically being concerned with transfer payments. Obviously distribution of handling costs in terms of distribution is tremendously important, but, in this paper, the issue that was given to us was, what are the costs to economy of occupational disease. From the economists viewpoint that involves foregone resources.

Essentially there are three sets of costs that one needs to include in that kind of analysis.

First we suggest that by far the largest cost is what we call opportunity cost or alternative cost. These are costs of foregone earnings and foregone production. What we lose when workers, because of illness or morbidity or early fatality, are unable to work, unable to produce. That by far represents the largest single cost in the economic perspective of occupational disease.

The second are the medical costs and medical and related costs and health costs. Costs involved in the diagnosis and treatment of diseases that we recognize. And here there are some quantitative estimates made available by HEW on the health costs of various diseases; not occupational diseases, but diseases, ordinary diseases of life which in many respects are not terribly relevant to the diseases we have been talking about today.

The third set of costs are those that involve the cost of administration. These are the costs that are incurred in running the system. These are

actual resources that are spent, or expended in the process of litigating, adjudicating, dealing with claims.

The three of these represent the total cost of occupational disease.

There are enormous problems in trying to aggregate these costs and calculate them and the view I take in the paper is it is probably verging on the dishonest to do that in the aggregate. That is, it cannot be done.

This framework, this three-sided framework which I just described, is a manageable one from an economic perspective. While economic costs are formidable they can be dealt with in the presence of adequate health insurance data, assuming that reasonable data on morbidity and fatality existed—and they do not—cost calculations could be undertaken.

However certain conceptual issues would first need to be resolved.

Obviously, before calculating the costs of such diseases we need to arrive at some agreement as to what constitutes an occupational disease. The problem which troubled Mr. McMahan the first day of the session and most others by the second day of the session.

Some diseases which are obviously widespread and costly present immediate problems. One issue that hasn't come up and should is the matter of alcoholism, and whether or not some stretch of reasonable people's understanding alcoholism could be considered as an occupational disease.

One can readily become intimidated by the scope of this issue by substituting the psychiatric disorders for alcoholism. Evidence of greater and lesser quality abounds on the relationship between job characteristics and emotional problems.

For those inclined to readily incorporate such illnesses and their attendant costs into an analysis of the overall costs of occupational diseases, they would also presumably include both the symptoms generated through job insecurity and job loss, and those that arise when persons are without work and unable to find suitable employment.

This is not to belittle the matter of emotional disturbances or to suggest that they ought not to be included in an estimate of disease costs. But, unless one deals with a well established hazard such as carbon disulphide, which Dr. Mancuso has ably demonstrated, is linked to suicide rates of rayon workers, one is tempted to discuss psychiatric problems related to workplace phenomena.

The problems are essentially those of aggravation and etiology. We have said that over and over and over again in this conference. And until we can get a better understanding of that, I think it is naive to dwell at length on the aggregate of the cost of occupational disease.

I tried to spell out very simply and very briefly on pages 14 through 16 what I believe is the requisite data before one can accomplish an estimate of the cost of the diseases.

Now I would like to address myself to who pays for occupational diseases? Who pays the cost?

I would like to point out that here I am at odds somewhat with the views expressed earlier in the papers by Messrs. Conley and Halpern.

Thus far this paper has dealt with the economic losses due to occupational diseases. It did not cover any of the distributional aspects of the disease problem; who pays for the cost of occupational disease? No adequate answer yet exists for this matter, but here, too, some

elements of an analytical framework have been developed in the absence of data that would allow some meaningful estimates.

Some very small forward steps have begun in evaluating the cost burden through Wayne Vroman's paper for the National Commission on State Workmen's Compensation Laws. His concern primarily was with the costs of insurance and did not directly confront the possibility that compensation benefits do not fully replace the expenses a worker incurs who has been disabled on the job.

Because, the National Commission found that the State systems typically were both "inadequate and inequitable" in this regard, that issue need not be developed again.

Sufficed to say that in a vague and superficial way, where the system does not fully compensate disabled workers, the costs are largely borne by the worker or by society at large.

But, this is very far from the full story. For the case of most accident and injuries—and in some cases of occupational disease—compensation costs flow out of premiums paid by employers on covered payrolls. Such costs are precisely akin to a tax on wages much like social security, unemployment insurance, et cetera, and raise the price of labor to employers.

For some firms the tax will be stiff, while for others it will represent a trivial part of payroll expenses. The imposition or increase of this tax may be fully borne by the employer in the shortrun, or may be immediately shifted forward and the price of the product raised sufficiently to fully cover the cost of the tax.

But, an increase in the price of the product will cause the quantity of product demanded to decline and thereby raise the level of demand for other goods, primarily untaxed substitutes of the goods in question.

Thus, most firms will find resistance to fully increasing prices by the level of the tax and, instead, will attempt to shift backward the tax burden by keeping wage levels from increasing as much as they otherwise might.

Note that where such taxes are fully shifted backwards, the compensation costs are borne by labor despite the appearance that it is capital that is paying the cost. If the tax is only partly borne by labor and by product purchasers in the form of higher prices, some of the burden will fall upon capital. While capital may be immobile in the shortrun, this is not so for the longer run and it will be reallocated to those sectors where the return to it has not declined.

The full scenario cannot be worked out here. Hopefully, however, the naivete is apparent of the early compensation theorists who sought to have the product bear the cost of accidents. Depending upon demand and supply elasticities in the product and factor markets, and upon the elasticity of substitution between labor and capital, the cost of compensation will be borne in varying proportions by labor, capital, and product buyers. This analysis is more fully and elaborately provided by Vroman. Unfortunately, it provides no special insights into the quantitative burden that each of the parties must absorb.

The above analysis must be modified for the case of occupational diseases in recognition of the manner in which they differ from accident and injuries. Two quite different kinds of analyses can be developed.

First, assume that employers and workers are aware that a disease problem exists due to the work, but that the opportunity to be compensated for such illnesses is negligible. The absence of compensation benefits could be accounted for several ways, including problems in establishing proof, tough courts, and compensation agencies, the presence of narrow and limited schedule of covered diseases, and so on.

In such a case where labor is mobile, it will move to other industries where wages are comparable, but where working conditions are more healthful. To retain labor, the firm will be forced to pay some premium to compensate for the unpleasant circumstances of the workplace. Yet, this will make labor more expensive and as the firm has the opportunity, it will replace labor with equipment. As the price of the product increases it will cause buyers to seek out substitutes.

Note that this apparent abstraction would seem to perfectly describe the conditions prevailing in the labor market for coal miners up until the present decade. It probably characterizes the labor market for asbestos workers as well. In any case, such a model would suggest that even where no workers' compensation is paid, the market causes some of the costs to be borne by nonworkers.

Additionally, for those workers who earn the wage premium for engaging in a risky operation, but who do not ever contract the disease, they collect a rent that partly balances the losses of those who do contract the illness but receive no compensation.

Thus, one would want to be very careful about asserting that workers bear more, or all, of the cost of diseases even where no compensation is paid. Such an argument seemingly neglects to include the remuneration received by all of the exposed workers in the occupation or establishment in question, not simply those who fall victim to the disease. And that remuneration need not come about through some explicit arrangements, like the bargaining situation.

The second analysis that may more accurately describe the situation of occupational diseases than does the model found in Vroman, begins with the assumption that no compensation is provided and that employers and workers are largely ignorant of the risks of the work.

Such cases are probably most frequently and significantly associated with diseases of long latency. They would involve illnesses that the scientific community has not or is only beginning to link up to workplace exposures.

Even within this broad grouping one could find numerous examples where some wage premiums are provided—and hence similar to the model I just described—although in this case there is no recognition of a disease problem.

These cases would occur where the hazards, through not understood to be associated with a greater probability of premature mortality or morbidity—whatever that means—create sufficiently unpleasant working conditions so as to command compensating wage differentials.

Examples of this would include premiums for highly stressful work, air traffic personnel, certain executive positions, et cetera—or for employment under hot, dusty, noisy conditions, the top side of coke ovens in foundries.

Aside from these positions that do involve additional pay for conditions that give rise to health problems, but where no understanding of the potentially precarious nature of the work prevails, there

exists the example of ignorance and no compensating wage differential.

Thus, while working conditions may appear to be healthful, in fact they are not, but neither the employer nor the worker have yet perceived the risks.

Obviously, without a workers' compensation premium or a wage differential that reflects the disease problem, neither the price of the product nor the capital-labor ratio will be affected and the burden of the disease will fall largely on the household or on the public, through the subsidization of health and income maintenance efforts described earlier by Halpern and Conley.

Surprisingly, though, it would be wrong to conclude that the employer and the price of the product are totally unaffected even in this extreme circumstance. I hope it is extreme, but probably it is not.

At least two sets of costs are still borne by employers in that case.

First, the firm must absorb some of the costs of unanticipated, and presumably higher than otherwise, turnover. Those expenses would include sickness insurance, possibly life insurance, as well as the costs of severance, costs of recruiting, new training, and so on.

Second, where workers have received training specific to the firm, unanticipated turnover means that the employer's investment in his workers will be jeopardized.

Unlike the situation where the employer anticipates the development of a disease, hence providing little or no specific training or making certain that the period set to recoup the investment is a short one, the employer finds that his investment in labor has not been profitable.

Thus, even under these circumstances the employer bears part of the burden, and by shifting forward some of these will likely also involve the product price. Obviously, the employer's burden becomes quite small where no specific training has been provided.

Because we believe it is inappropriate, if not impossible, to estimate the aggregate cost of occupational disease, part two of the paper is an attempt to show you a simple model, simple but eloquent model of what the cost of occupational disease may be on the basis of a single plant and a single hazardous substance.

Dr. BURTON. Fred?

Dr. COLLIGNON. I would like to talk about my paper and add a few remarks relating to it. But, what my part of the paper essentially is, is to provide an estimate of the magnitude of the social cost. The question is: why social cost? Social costs often seem like an abstract constant to the economist. It is not always clear who pays them.

The importance to workers' compensation is clear and includes a number of earlier arguments we have raised in the last 3 days.

The theory of workers' compensation as Doctor Halpern pointed out would let the producer see the true cost of decisions about production he is making. If in fact he is imposing large costs on the workers, to try and internalize these through the production process in the hope he will be forced to raise the cost, that he would attempt to pass it on to the consumer. And, you would thereby, in the market, create some incentive for him to reduce production or change production methods basically to achieve some sort of prevention of occupational hazards.

The social costs were attempting to estimate at least a basis for deciding whether in fact with workers' compensation there would be

an incentive for changing technology, for changing the forms of production in order to reduce these occupational hazards.

It also gives the sense in terms of Dr. Burton's earlier statement in determining what is at stake when you are talking about avoiding these occupational diseases altogether.

What really is the benefit that would be available to society of attempting to regulate those hazards to prevent the cost from arising in the first place? What it would actually cost to begin indemnifying the cost associated with these hazards.

Now, unfortunately, in trying to estimate costs, there are numerous problems. A lack of data; a lack of even data as to the number of people affected the lack of data on earnings; a lack of data with regard to litigation; the lack of data on costs; the unclear medical data.

We took the very simple outlet of taking one well known example—that presented earlier by Dr. Mancuso in his paper of chromate workers and the occupational disease they suffer—and attempting to make a number of highly simplified assumptions in the absence of data to put a cost figure on that effort.

In this case, a 1964 survey found that of some 350 chromate workers in an Ohio factory in the 1930's, party one subsequently died of lung cancer, an excess of 34 over the expected mortality rate for a population similar in demographic characteristics.

This excess of 34 deaths is claimed to be attributable to the work setting and the evidence of the existence of an occupational disease.

The latency period among those who subsequently died was 27 to 36 years, with most period lengths clustering around 31 years after first exposure.

We assumed, based on some data—it was our understanding that the average worker experienced 1 year of total disability preceding death.

Since the model age for those dying of cancer was 31, we shall assume that the average victim began work in the factory in 1933 at the age of 30 and died of lung cancer in 1964. We assumed they stayed in blue collar employment throughout their work life and made the average wage in manufacturing in 1933. And that the average manufacturing wage for their respective age group would be representative of their potential earnings after 1933.

Given these rather basic assumptions, which in some sense greatly imposed further simplifications on the *Mancuso* case of chromate workers because we lacked more detailed data, we take the reader through the analysis of a wide range of factors affecting cost.

Essentially the cost, looking first at lost output, is highly affected by the age of the worker. Given the latency period, the younger the worker the more years of lost output which the worker is going to experience.

The length of the latency period itself becomes a major factor.

We look at the pattern associated with morbidity, and in this particular case, one was assuming only a year of total disability. In other occupational diseases, the period of total disability would be much longer.

Usually we had very little data at all about partial disability or the kind of morbidity pattern that may occur on the job through loss of productivity of the worker associated with the occupational disease.

It may not be diagnosed at all. Morbidity patterns can well introduce other costs beyond those associated with further disability, yet we usually lack data on them.

We try to lay out some costs, and measure of lost output due to these factors, and we then, having tried to assess the lost output, go into attempting to value.

The analyst relies on economic theory here, believing that individuals are paid as a wage their marginal productivity, so that the earnings of an individual accurately reflect the value of his or her output as measured by society's willingness to pay for the final goods or service.

We came up with a value based on the average manufacturing wage for the lost output of these workers and then we began moving through a wide range of factors that begin affecting really what the total loss is.

For example, in the modern industrial system increasingly a large proportion of what compensation workers receive may not be in the form of wages, but fringe benefits, and a growing share of compensation, and roughly the share we are talking about here, fringe benefits as to the cost of manufacturing as a whole, represented 20 percent of the production payroll, and a need for adjusting the cost.

We looked at the problems of inflation. We expanded it to take many other issues: lost-work output, which were not expressed in the marketplace at all. We talked of mental anguish. But, if one tries to reduce these to a common number, one finds that perhaps the biggest factor is the problem of discounting.

That essentially the value of these costs which occur 31 years hence in the case of the chromate worker began to dissipate very quickly when expressed at present value, essentially if we are to indemnify these workers at the time the producer made the decision to expose the worker to the hazard. By the time we have finished discounting, the cost becomes greatly reduced.

Within the paper we then also look at administrative costs, medical costs, and so on.

In terms of loss of output in current dollars, that is, the dollars the worker would receive in the year the output was lost, that amounted to \$24,900 per worker for a total of \$845,000 across all the workers whose illnesses were attributable to the work hazard. In 1975 dollars it is about \$42,300 per workers or roughly \$1.4 million.

However, once one discounts that, say a ten percent total discount factor, perhaps it is very reasonable for the employer setting aside this sum for indemnifying the illness. In fact, the amount you would have to set aside to indemnify the social costs amounts to \$82,000 a very large reduction over what appear to be the costs 31 years hence.

These costs have many aspects that can be misleading in terms of estimating what would occur in an insurance system. Essentially, if you were indemnifying these costs or assessing the costs to all the workers exposed to the hazard, some 350 workers, the cost of the 10-percent discount rate to the employer amounts to a total of \$250 per worker, which cost obviously is very small.

An insurance system, however, would confront many different kinds of cost units. We have talked from a retrospective analysis about the

nature and pattern of disease, and an insurance company would essentially be having to do this prospectively, not being sure of what the true incidence of occupational disease would be in the future, not being sure how to adjust for the cumulative exposure of time, related to the length of the employer or the intensity of the exposure. The problem in trying to develop any kind of indemnification is very difficult within the normal insurance system.

Similarly, how does one handle a prospective analysis; the future pattern of inflation which might be experienced.

Moreover, as Dr. Conley pointed out, one is having to bear what I will call the carrying costs of those workers who also died of lung cancer, but for whom ecological studies will not find it as being due to the occupational sites. Presumably, one has to pay these workers as well. Because the risk factor is on the order of six, it involves an increase in cost of only twenty percent. If the risk factor had been much less a level, as it appears to be in the case of occupational disease, this carrying cost could become even larger.

What become implications of this pattern then for workers' compensation? In terms of the goal of the workers' compensation employer indemnity creating an incentive for prevention, it would seem with this kind of cost being assessed to the employer, there would be very little incentive to change technological processes and methods of production in order to basically prevent a rise of the hazard.

In terms of compensation the amount of cost doesn't look that difficult to indemnify at all. However, the problem of doing this through an insurance system can be very problematic in trying to calculate these prospects of what these costs will be.

The problem is the insurance system is essentially asked to pay these costs not at the time the production decision is made, as would be the case in workers' compensation, but at the time the claims would be filed, some 31 years hence.

In this case, that cost, with the ten percent which we were saying is only \$82,000 ends up being roughly \$1,050,000 a huge difference in cost. Basically attributable to the latency period and uncertainty of trying to calculate any indemnifying factor.

In this sense the problem can be stated, in terms of the cost, it might be feasible to do it so far as the money you set aside for the current production decisions. The cost for indemnifying, however, past mistakes in production, 30 years hence, can be quite large, and as we said before, they are still unknown. We don't know the magnitude. It is a great deal with regard to trying to forecast information after the fact, in terms of the cost after the fact, which are often unknown.

With that I will close.

Dr. BURTON. The discussant will be Mr. Russell Guy, manager of safety and workers' compensation at Bethlehem Steel.

Mr. GUY. I would like to commend Drs. Barth and Collignon for tackling such an impossible job. After having listened to the participants in this conference for 3 days and reviewing all the papers, hearing all the medical evidence, I am convinced that the cost of occupational disease should be left to a soothsayer with a broken crystal ball.

I learned a long time ago when cross examining experts to make sure you get them to talk your language. I couldn't enjoy that luxury

today. However, at the outset, I think we are in complete agreement that it is virtually impossible to develop any reliable cost estimates regarding occupational disease. One of the prime ingredients in any cost program is identification of the universe to study.

As we have heard during the last 3 days, it seems that new diseases are being discovered on a weekly basis, and we are only beginning to suspect and understand the implications of various environmental exposures.

Research concerning the effects of multiple and environmental exposures in combination with industrial exposure is in its infancy.

We have not even reached an agreement on the definition of occupational disease. And, I foresee us debating long into the future the degree of responsibility for which the employer, consumer, and society will ultimately be held responsible.

It is safe to assume, therefore, that the magnitude of the cost of occupational disease is not known and will not be known for some time to come.

Both Drs. Barth and Collignon view costs from an economists point of view. The cost of occupational disease as identified by them is the loss to society at large of the incremental contribution of a product that a sick worker cannot produce. Or, simply the loss of output.

Direct benefit payments paid to the employee by the employer or insurance carriers is relegated to a secondary status and is referred to as transfer costs.

While loss of work output is a major concern, I wonder what relevance a cost factor of this nature has assuming a reliable figure could be obtained with respect to the direct costs of occupational disease or the future compensability of such diseases.

If we accept all the assumptions set forth in this paper, then I submit it is difficult to disagree with the conclusions. However, for example, many union contracts are bargained industrywide, and the individual firm experience is not relevant, and the firm would not be able to suppress wages as suggested.

Further, the assumption of direct output is based on the premise of production directly proportional to man-hours, and this does not consider the nonproduction jobs such as service or maintenance.

Other questionable assumptions are the 20-year latency period and 1-year disability. The starting age of 30 years, earning assumptions, and full employment status. However, with an unemployment rate of 8 percent-plus this last year, and an historical figure of 4 to 5 percent, it is safe to assume workers are available to fill the voids created by pension, injury, and job termination for whatever reason.

I don't mean to imply these costs are not significant. It is that the costing problems become difficult to manage and often almost obscured when factors such as long industrial disability and death, voluntary terminations, vacations, and other work interruptions have an equally significant impact on production.

Rather than concentrate on the chromate worker, I would have much rather seen Drs. Barth and Collignon focus their attention on costing out the black lung program or a small portion of that program. Don't forget, this program is the only nationally enacted occupational disease

law and applies equally to all coal miners. Significant data is available in the files and a cost study would provide us with valuable up-to-date information regarding foregone output.

I challenge the economists in the group to perform such a study. I think it would be invaluable.

On the other side of the coin let's consider the transfer cost or direct costs as I prefer to call them. No matter what label is placed on these benefits, the common denominator is dollars, and I think what we have really been talking about in large measure the last 3 days, is the allocation of dollars. A significant factor in determining these potential costs is the total number of claimants and beneficiaries, and this becomes an awesome task.

Again I would like to refer to the experience under the Federal Coal Mine Health and Safety Act. When this legislation was first being debated in Congress, cost estimates for the program were placed at \$120 million annually, and many argued this figure was much too high.

I would be remiss in my job if I didn't point out some of the cost experiences in connection with this occupational disease program.

Social Security under part B of the law has approved for payment approximately 385,000 cases out of approximately 550,000 filings.

The Department of Labor has received approximately 80,000 cases as of January 1, 1976, with an approval rate of approximately 15 percent of those cases processed.

Since the enactment of the black lung benefit legislation a total of \$4.27 billion has been appropriated to the Social Security Administration and \$20 million to the Department of Labor through fiscal year 1975 for payment to beneficiaries.

The Social Security Administration has a proposed fiscal year 1975 supplemental request of \$81.6 million, and a fiscal year 1976 for approximately \$1 billion for payments to beneficiaries.

Fiscal year 1976 request of the Department of Labor was \$20 million, and as of December 31, 1975, the Social Security Administration had made accumulative payments of \$4 billion, and monthly recurring payments of over \$82 million.

The Department of Labor has distributed about \$12 million to beneficiaries as of December 31, 1975.

Now, let's talk about administration costs. A total of \$163 million was appropriated for administration of the program by the Social Security Administration from inception of the program through fiscal year 1975. An additional \$12.8 million was requested in fiscal 1976 for their budget. As of December 1975 a total of \$155.3 million has been expended.

The appropriation request for the administrative expenses of the Department of Labor from inception of the black lung program through fiscal year 1975 has been \$15 million. An additional \$8.7 million was requested for fiscal year 1976. As of December 1975 a total of \$15.9 million has been expended.

Now, the quoted figures do not really reflect the total cost. Many claimants are filing and receiving State program benefits. For example, take the Kentucky special fund—financed by employers—it paid out approximately \$20 million in benefits, black lung benefits during 1975. The same holds true in other coal producing States.

At this point I want to emphasize, and I think it is significant to know we are talking about benefits to an industry that employs approximately one-tenth of 1 percent of the total work force in the United States. One of my major concerns in the area of costs is that of pyramiding benefits.

Let me cite an example of what is happening in this area today: consider, if you will, a 65-year-old miner with 30 years' experience making \$50 per day or \$13,000 per year, who decides it is time to retire and has a dependent wife. Assuming a medical doctor verifies he has some evidence of pneumoconiosis and should not be working in the mines, he can, with very little trouble, qualify for State black lung benefits in Pennsylvania at a rate of \$185 per week, or \$9,620 per year.

In addition, social security benefits would amount to approximately \$6,300 and a union pension amounts to another \$4,500 per year. The total benefit package amounts to \$20,420 per year, and I want to emphasize, that is almost all tax free.

Taking this further, our claimant has a remaining life expectancy, making his benefits actuarially worth \$280,000. And bear in mind, the employer pays a substantial portion of all three benefits.

Another important area to consider and discuss the costs is the extent of the applicable law. The Black Lung Benefits Act of 1972 which amended the Federal Coal Mine Health and Safety Act has a broad beneficiary group which goes further than most State workers' compensation laws. On the other hand, most large State workers' compensation amounts in large industrial States provide coverage for all causally related diseases, as does the Longshoremen's and Harbor Workers' Compensation Act. As reported by the National Commission, all 50 States provide coverage for occupational disease. However, problems do exist where the state of limitations is unduly restrictive and other problems in that connection that were pointed out in the past.

Where are we headed in this very complicated field? Do we adopt a modified English system and pay benefits to all occupational disease claimants from one source, financed from Federal revenue funds and employment contribution, or some proportionate basis, or should we exclude workers' compensation to cases for which causation cannot be established and those financed through the social security system?

Do we try to curtail the abuses in the permanent-partial disability area, thereby making available more dollars for adequate coverage of total disability cases including occupational disease.

Another possibility is to provide offsets in the workers' compensation system to prevent duplication of disability benefits, and I recognize this is not a proper cost.

In balance and in summarizing and recognizing we are dealing with dollar allocations, I ask we not become so entangled with the legal and cost ramifications that our attention is diverted from the very necessary work that must be done in the area of gathering meaningful data for developing research techniques and minimizing the work exposure hazard.

Dr. BURTON. Thank you.

I think what we will do is take a few minutes to see if there are questions or comments directly on the paper just presented, and then in a few moments open it up for more general discussion. Dick?

Mr. SCHUBERT. One on Peter's part of the presentation. He properly points out the limitations involved or impacted on industry in passing on all additional costs through the price of the product, both competitive domestically and competitive in foreign limitations, at least. Then he talks about shifting some of the cost backward and the potential impact on labor.

Let me just state one other very real consideration. Another possible shift is to have industry to simply try to absorb the increased cost by reducing retained earnings and profitability. The impact of all that is that that particular company, that industry is less attractive in the equity market, less attractive to lenders in the debt market, which means as a practical matter they will have difficulty expanding and creating opportunities for greater employment.

Again, going back to something a couple of us referred to in earlier portions of our conference, there is a legitimate concern about job creation over the next 10 years or so.

One comment in respect to Professor Collignon's presentation. He is optimistic and properly recognizes the problems of picking up on an insurance basis or otherwise the funded liability of the past since we really don't know what it is going to be given the latency tendencies of cases. But, he is very optimistic that we can project into the future and create some kind of a fund to care for those subsequent needs and costs.

I wonder whether 15 years from now we are still not going to be in the process of discovering new disease implications and new causative factors, and whether the problems that we all recognize will not be with us almost indefinitely as we introduce new substances and discover impacts of the new and old substances.

Dr. COLLIGNON. A quick response to that—I view the problem of the past indemnification to be one simply not of just the money involved, and I share completely the anxiety of trying to forecast in the future the mount of money involved. I think in a complete forecast it is not that much. But, how one would in fact do it is very unclear.

Dr. BURTON. Mr. Solomons?

Mr. SOLOMONS. I think Drs. Barth and Collignon ought to be commended in their effort to discern the true social cost of disease through construction of an economic model into which all the various factors we discussed can be evaluated. I don't believe that we can discern—we can actually sit down and discuss what the cost will be and obviously that is one of the primary considerations here in this conference—until we have a meaningful way of determining exactly what costs we are talking about. And I think each of the kinds of costs discussed are particularly meaningful in terms of the larger figure.

Most of all I would like to caution against the kind of analysis which Mr. Guy presented. Especially the kind of analysis that utilizes figures and statistics which arose out of the black lung program.

I think with respect to the black lung program, and especially that part of the program which gives rise to the \$4 billion of liability, it

should be pointed out, first of all, and I don't think it is a secret any more, Congress said to the Social Security Administration, you find these people one way or the other that you consider victims of black lung and you pay them. I don't think this program can in any way be related to occupational disease or the workers' compensation program, because it is not that.

And I examined many of the files that the Social Security Administration has processed, and I don't think you can get anything but a most distorted picture out of the figures which arise out of that program. I think the figures that arose out of the Department of Labor program may be more helpful to those figures as you pointed out.

I think what we are dealing with here in utilizing those kinds of figures is in fact a distorted picture and not one which should be taken seriously in terms of determining where the actual cost of occupational disease would be.

Also, in noting that particular aspect of it, I don't think we have discussed in this conference that we are talking about paying for all the inequities of the past when we are talking about the compensation laws or talking about changing the system for handling occupational disease benefits. I don't think anybody is talking about that.

If you are talking about that, then, of course, you are facing what is from the cost standpoint probably an unmanageable situation. But, if you are talking about changing things now, in the future, I think that—going back to the point I tried to make this morning—your expectations may be far more dramatic and far in excess of reality that you will find under the black lung program, and I think our facts prove that.

Dr. BURTON. I think I will make one brief comment. There is confusion in using the term costs. I don't think I can possibly end that confusion, but I think there are two different approaches, that reflected in the Barth-Collignon paper on the one hand and Mr. Guy on the other.

I think the economists are saying the cost is, of occupational disease, is the impact on resources particularly the loss of output that may result from an occupational disease. I think there is a more common use of the term costs which a noneconomist would have, which would be some measurable amount of money which is expended in situations which we identify as involving occupational disease.

Now, in fact taking an extreme case, you might have a situation where a worker was not at all disable and had no lost earnings, no lost production, even though in a sense he had an occupational disease. Now, the economist would say that particular incident involves no cost. Nonetheless, you get superimposed on that a law that says we are going to give this person \$10 or \$1,000 and that will be paid by the employer.

Now, that is obviously, to that employer in a meaningful sense a cost he has to bear and the fact an economist may not call that cost may not be too much consolation to him.

I think it is nonetheless worth maintaining the economists' approach to this extent: what we are talking about in the example I gave is really a transfer payment. We are really—there is no resource loss

to society in that case. It is simply in effect taxing one person and giving it to another, and that is a phenomenon which ought not to be itself identified as a consequence of a true occupational disease.

Dr. HALPERN. There are a large number of hidden costs, and most of the people who spoke and are economists have not alluded to them at all.

For instance, there are a large number of hidden costs and that is when somebody suffers from a kind of occupational disease or injury or a wide variety of other things, it places an extra burden on the human service delivery system. It is a cost to society. One extra person, whether they file an O.D. claim or whether they get it or not, if there is something wrong, they can make free use of the facilities that are available and these are not necessarily charged directly back to the cost of the production. That is a cost that has to be added, which has not been included.

Dr. BURTON. Peter, would you respond to that?

Dr. BARTH. There are two problems. It is a problem of my own ability to communicate clearly either in writing or in rapidity of delivery.

I think we are very much aware of the costs you are discussing. I am very certain we recognized them. We separate them quite carefully into the transfer payment component—obviously, that is a cost to society and has to be treated.

Dr. BURTON. Barry—

BARRY CHISWICK. There are social costs which are not included in resource costs.

I was especially attracted by the points Barth made in his paper about looking at the question—assuming one could—what kind of compensation will I have to give you in order to be willing to take the probability of getting a disease 20 years in the future? If one can do that kind of experiment, that would give some means of estimating what the other costs are. Pain and suffering costs.

I want to ask a couple questions related to this paper and to the issues that have been raised. Talking about conditions for diseases which we know do affect the workers who are currently in that job or who will be in these jobs in the future. How can we best design the workers' compensation system or another system to encourage more socially efficient methods of production?

Much of the discussion thus far has been in terms of the standards of reduced skill or output. There is also a question of gaging that production taking place.

Is there a way of providing incentives for firms to change the way they organize production to reduce the incidence, and I would like to see some discussion of that if possible and related to that labor policy.

Perhaps there is some evidence to be drawn from the long latency periods. Perhaps there is some evidence to be had from the incidence of the disease.

With the assumptions raised yesterday you can work somewhere in some environment and be exposed to some material for 10 years, you won't have any effect; but, if you stay more than 20 years you are sure to get the disease—does that suggest perhaps the labor policy

should be one that you can only work 10 years and no more in that industry? Would that perhaps be a cost minimization solution? And I think it would be good to get comments on that from both labor and management sources.

Dr. BURTON. Dr. Mancuso.

Dr. MANCUSO. Let's assume as someone says if you work 5 or 10 years you won't get the disease, but if you work longer—that is only predicted on the exposure. If you decrease the exposure the man could work all of his life in a particular place. The whole question really is controlling the work environment and preventing the exposure.

Someone else made a comment about the cost of literally putting industry out of business. I would like to submit, for most of the problems, we not only know how they can be controlled, and it has been known for maybe 30 or 40 years, and I think about 98 percent of occupational exposure can be controlled by methodology already known. So, I think one should shift the emphasis relative to the cost and try to prevent the problem in the first place, and if a concerted effort, where a percentage of funds were devoted to accomplishing that—I remember years ago when I was in Ohio, the State Industrial Accident Commission had a fund where one percent went into the Safety and Hygiene Division. Frankly, with all due respect to them, they didn't do their job and the money wasn't properly administered or funded or carried out. But, basically the State Workers' Compensation Fund, if a certain percentage of it was properly used to carry out prevention, investigation of prevention controls of the problems in those facilities, you would prevent the problems from occurring.

Then I would like to refer to the point Mr. Guy and Mr. Solomons made. I appreciate you really can't make a comparison with black lung. This is not, as I understood it, a retrospective accumulative thing. Relative to black lung they went back and got all coal miners, you can't make that comparison relative to trying to improve the present ongoing system of workers' compensation. No one is saying one goes back and takes in all diseases that have occurred in the last 30 years. That isn't the point. There are time limits already established.

BARRY CHISWICK. May I respond? I am afraid I was misunderstood. Maybe I misspoke.

There are many ways of reducing exposure. One way is to reduce, let's say, the dust level at a given point in time. Another way is to reduce the length of time one is exposed to a given dust level.

And I think one person that spoke before talked about the beneficial effects, side effects of the fluctuation and activity in the coal mine, which in effect changed the period of exposure. Somebody was "working in a mine 20 years, was not really working underground for 20 years—they were unemployed 6 months, so he was working underground only ten years."

There are many ways to talk about exposure and different ways and different implications to cost, and we should keep that in mind.

Dr. BURTON. Let me make an example which may be a little less offensive to most people in terms of the choice I think they are posing.

You might visualize a situation of a air traffic controller where they operate under a considerable amount of stress. Now, one way of dealing with that particular occupation is presumably to restructure

the way the air controllers operate. That, however, may be so technologically expensive, in fact even infeasible, it may be better for everybody concerned, including air traffic controllers, to visualize this as a job you take for 20 years, much as we have policemen and firemen that take a 20-year job. Rather than thinking about what would be the cost of redesigning the air controller's job so we can let workers hold that job from the age of 18 to 70. I think that would be exceedingly expensive for the restructuring of that job.

Mr. SCHUBERT. Psychologically, that would be just a very difficult proposition to sell as a practical matter because job descriptions and classification programs have been used in American industry for the last 30 years or so, and those programs go into job rates. The concept of heat and mental and physical effort and surroundings, but there never was a conscious judgment that you are paying higher wages because of increased exposure to disease, or increased rehabilitation.

I just think psychologically it is really going to be tough to sell that to the people who have a legitimate concern about protecting their own livelihood and own well-being.

I have the same kind of problem with Barry's question about some kind of dust emission chart. It really doesn't get to the heart of the problem, the protection of the workers who are involved.

One other thing. I think the black lung cost picture is quite relevant, as Don indicated this morning from his legislative perspective. There are still a significant number of legislators who would replicate the black lung program for other diseases, and if they did so, they would follow the same general concept of assessing part of the cost to the general treasury and part of the cost to employers.

If they did follow that route as was done in black lung, the employers would do exactly what the coal operators did. They would go out and beat the bushes and get everybody in under part B to pick up their payments, and I don't think that cost experience is irrelevant at all.

Dr. BURTON. Mr. Guy?

Mr. GUY. I would like. I don't think the conference is limited to diseases that occur from this day forward. As Dr. Selikoff very ably pointed out with the silicosis problem that existed in shipyards during World War II, are we going to tell these people they can't be compensated? We can very well create a title IV for silicosis cases, and I submit that cost would be trivial compared to the black lung cost, if that did occur, and that is not an impossibility.

Dr. BURTON. Dr. Halpern?

Dr. HALPERN. I totally agree with Mr. Guy and two other points, very briefly.

The concept of a limited duration activity, or a limited duration occupation is not an alien one to this country. Most professional athletes don't expect to spend more than 10 years in the job, and it is not totally alien and not totally impossible.

There are people who take jobs and know full well they have an expectancy in that occupation of 10 years, or may be even less.

I would also like to address the point Doctor Mancuso made, and I am having a tremendous amount of difficulty with it. He made the statement, and correct me if I am wrong, that if you are willing to put

front-end money in now for prevention, then we could eliminate a large number of occupational diseases and in fact most occupational diseases.

I have trouble reconciling that fact with the fact we can't anticipate so many occupational diseases at the present time as new substances are being developed.

Dr. MANCUSO. I will respond to that. To make it quite clear. You take a work environment and you control the work environment. What I am saying is, all new employees coming into that work environment, under controlled conditions, you can control and prevent any occupational disease from occurring. That is what I said. That is the point I am making.

Dr. BURTON. Well, that assumes you know all the things that might adversely affect workers. I was struck by the fact the Dr. Halpern-Conley paper, they made reference to the ill affects of fluorescent lightbulbs.

Dr. MANCUSO. Well—

Mr. SCHUBERT. Tom, that is a very terrible simplistic approach. It assumes you know. Two, you know how to control it, and three, you can afford to do it.

Dr. MANCUSO. For the record, it can be clearly stated there are known and very clear and very definite methods of controlling all toxic substances in the environment at the present time and any and all toxic substances that can come into the environment.

Mr. SCHUBERT. That can come in? You don't know what it will be

Dr. MANCUSO. Why are you bringing that—well, I think we are going beyond—

Dr. ROBERTS. May I comment a little on it? To be practical, I think Tom's point can be restated this way. We are certainly underutilizing the protective means we have. This is very definite. That there will not be any vinyl chloride and other things of this sort appearing in the future, we can give no assurance. We know we may come up against something that we are not protecting against at the present time adequately, we can't protect, to be practical, perfectly against everything today.

Dr. BURTON. Mr. McMahan?

Mr. McMAHAN. Mr. Guy and Mr. Solomons have raised a question that the task force should be very much aware of. I agree with Mr. Guy's remark that from what I have heard in this conference, especially people talking about discovery every week of long latent diseases, that they are not contemplating these diseases that resulted from exposure 30 years ago as just being an aeducational example and we will not compensate them, and going to really think about those being exposed now and will get sick thirty years hence.

I think the Task Force has to consider that any possible demands for relief that are to be satisfied here have to be viewed very much like the black demands. That you are going to have to consider solutions for existing disability that could have been initiated long, long ago, and as well as solutions for prevention of that in the future and compensation of its consequences in the future.

And that may take two very different approaches. One I think personally so far as the existing newly discovered great body of disability claims is just about, must be a public obligation.

Mr. STEVENSON. The subject is interaction. We are not dealing with any nice static term.

Let me give an example of the job functioning of a foundry and interaction with a whole bunch of programs that make some of the things Doctor Mancuso said so nice and easily true.

OSHA has a set of standards on coke ovens, which will probably put them out of business. Which, along with the EPA requirements, on kublars, kublars will probably be put out of business because they can't get the coke and can't keep the pollution down.

So, they will come up with an electric arc furnace.

Now, the problem with air emissions in a foundry is compounded with that electric arc furnace. It is in knowing how to do it and controlling it engineeringwise.

What is happening we have a moving target. EPA does something, OSHA does something, somebody else does something, and you have different occupational diseases.

This is one of the interactions that we have to be very careful with.

Dr. BURTON. I will now try and take the discussion back to the issue I posed before lunch in the terms of program interrelationships and perhaps to narrow it a little bit more. Let me for the moment try to combine the discussion to interrelationship of the program's two attempts to compensate workers for occupational diseases or diseases in general. For the moment let's set aside the interrelationship between workers' compensation and OSHA. Rather, let's talk about how do we go about compensating workers.

And to remind you of the distinction I was trying to suggest before lunch, perhaps one way to approach the point of interrelationships is to distinguish among different types of occupational diseases or diseases, I guess would be, in general those diseases clearly occupational in origin, those diseases nonoccupational in origin, and those diseases where there are multiple factors that cause the disease on which the environment and work-related factors, heredity, may all interact in causing the disease.

Some other distinctions which I think have come out in the discussion in the meantime which may also bear on the question of interrelationships is concerning the latency question. Perhaps we also need to think about in terms of the program interrelationship the difference between diseases where the long-latency period is involved and diseases where the relationship between exposure and disability are shorter periods. I don't know if it is a critical distinction or not.

There is another distinction which has come out and I don't want to get this so confused nobody knows how to respond, but it is a point that comes out of the discussion here about retrospective coverage of diseases, that is diseases which are already out there, only waiting to be manifested, and prospective coverage of diseases, that is diseases for which the exposure may occur from this time forward.

Now, having given you several dimensions to consider the problem of program relationship, what is the answer, if any, to relating workers' compensation to other programs? Should workers' compensation go along for some or all kinds of diseases, should they be turned over to another program, or should there be sharing of certain kinds of diseases?

John?

Mr. LEWIS I hope my comments, which will not answer anything, but instead raise another question, fit within the framework of your standards. I don't know if they will, and when I am done it will be too late anyway, so I am going to say it.

One of the problems I think we are facing has been articulated in terms of the interrelationship between workers' compensation, social security, pension programs, and things of that nature—and the retiree situation.

A number of States—I think Michigan was the first—and now I hear it from Pennsylvania in particular, claim to have and may well have substantial problems in their system because of what they perceive to be improper allocation of funds in cases involving retirees.

I see this problem being intensified as a result of the occupational diseases we are talking about. And in fact, we are going to have to resolve when we try to determine the proper interrelationship of programs, what it is we are compensating for.

If I might cite some history briefly—the history of workers' compensation, according to most, constituted a trade—no-fault liability on the part of employers for the elimination of pain and suffering remuneration and things of that nature that were mentioned previously. And that, in effect, what we were dealing with was a wage loss situation.

Now, from what I understand here in the last 3 days, many of the diseases we are talking about will not manifest themselves in a significant form until retirement age—in the 1960's, 1965 or so—when one would expect the individual to have retired. And then when he comes in and asks for compensation benefits, the immediate reaction is going to be one of, well, you have no wage loss and in terms of the compensation system as we traditionally know it, that is not a particularly improper answer.

Unfortunately, we have got an extra wedge operating or a factor operating here in accidental injury. It is, while it is difficult to assign fault, it is fairly accepted that a large proportion of accidental injury involved no employee fault, or mixed fault, or no fault at all.

In many of the occupational disease cases that again we have been talking about, there is no employee fault whatsoever. So, if we rely on the traditional concepts of wage loss compensation, we may be looking at a large number of occupational disease victims at age 65 with no wage loss, in the traditional sense, suffering from a very debilitating disease which they were in no part responsible for, and perhaps suffering a lingering ailment, an ailment that makes his last years of life very, very uncomfortable.

I think the traditional concept of compensation may not be applicable to them.

And if there is any compensation to them, this can result in the kind of multiple payments that Mr. Guy referred to, and I am afraid that is a rather thorny problem that is going to have to be considered on the practical level because most of us here can recognize the true economic costs Dr. Barth referred to when we get to the political realities of Congress or the State legislature, it is the transfer costs that Congress doesn't really consider a cost which affects the disease and affects the individual worker.

And once you start doing it, for example, paying coal miners for a certain disease, it is hard to tell the coke oven workers they cannot get it because that is not a traditional, it is not a workers' comp program. And when the cokeworkers get it, it is hard to tell the ironworkers and steelworkers and so on.

Dr. BURTON. Doug?

Mr. STEVENSON. Mr. Chairman, there are two countries in the world that have adopted plans that sort of envelop the kinds of problems we have disputed here. We discussed whether workers' compensation, occupational disease, or something else, depending on which fund a person is paid from.

But in fact, in the United States everybody is paid some way if they are otherwise incapable of making a living.

In Japan, as I understand it, if an employer takes a man, he assumes responsibility for that man and his family the rest of his life. And, if he is unable to work, whether it is occupational or something else, they are taken care of.

The progenitor of the system as we call it here, although we call it not very perfectly, the Bismarck in Germany has one embracing system. Workers' comp, social security, unemployment comp, which we have separate programs simply administered between the three of them, they administer it as one program. If a person is unable to work because of illness, whether it is occupational or not, it is a State function to take care of them.

It seems to me implicit if we pursue the idea that everybody has to be taken care of—one of these two ways may be the eventual way these matters are taken care of and the distinction as to whether these are 100 percent caused by employment or a mixture of factors becomes immaterial.

I think that almost has to be part of the consideration in a conference such as this.

Dr. BURTON. Just for the record, I want to say, and it is one of the points you raised, Doug, and that is the question, if you were to do away with the distinction between workplace and nonworkplace causes of disability, you have to ask the question about what level of income support you are willing to provide in those cases. And, I think it is one of the issues the National Commission tried to face and in effect said we believe workers' compensation should have a different attitude toward income replacement than would exist in say a general income maintenance program.

A general income maintenance program, such as a negative income tax, is essentially to protect people from falling into poverty. Whereas, workers' compensation because of, perhaps, its historical background of, coming out of the fact an employe didn't have the right to sue in common law, that the level of benefits properly should be keyed to the replacement of a substantial portion of the worker's lost earnings, and that because of the benefits any man from a high wage work force would receive benefits far above any poverty level.

I think this is a situation that has to be faced up to if you are going to do away with workers' compensation as a distinctive program keyed to the employee benefits.

How are you going to go on this? Are you going to cut back on the general level of benefits to the negative income tax level? Or are you

willing to say we are going to have everybody get benefits that are now being paid in some State workers' compensation program and certainly being paid in some of the Federal programs.

This is an issue Dick Schubert discussed in our earlier deliberations. Dick?

Mr. SCHUBERT. I would like to take on your challenge and this is a personal representation—not for industry—not for Bethlehem.

But, there are five categories you laid out. I suppose what I would do without further thought or deliberation, and that is a luxury, I guess, is to put clearly occupational causation diseases into workers' compensation. If you accept what Tom has said, there is already a body of information which, when collated together, will show some diseases go into that category and theoretically we ought to, as information develops across the years, ought to be able to add to the list.

And two, set up a new program using the great mix category that you talked about where there is multiple factors interacting to pick up the retrospective problems and to pick up the long latencies where there are a number of employers.

And this means some kind of a general fund and to some extent it approaches Doug's concern. I am a pragmatist. If this is what we really need in society because this is a developing problem of great significance, then we have to develop a method to respond to it. I guess, John, I would agree that this second large fund concept would have a lower benefit level than—and I know the logic breaks down a little bit and I realize that but there isn't any perfect logic that is applicable anyway—but there would be a lower benefit level than for the first category, those that are clearly unequivocally, unambiguously related to the work force.

Dr. BURTON. So you have the five categories all assumed into those two things?

Mr. SCHUBERT. Clearly occupational, and I think growing clearly occupational, and basically everything else falling out of workers' compensation.

Dr. BURTON. Okay. Dave?

Mr. GLANCY. Since we are trying to clarify this, I would like to take issue with the false dichotomy that John raised about the no-fault occupational disease by workers. That is not true. There are many cases of workers who didn't wear the respirator or failed to wear rubber gloves when dealing with something or other, and there have been all kinds of fights in OSHA about what kind of personal protective clothes and who forces whom to do what. And I think it is really false. I am not saying which way we ought to go.

Mr. SCHUBERT. Under the law there really isn't any. It is the employer's obligation in OSHA and that is very well established under court cases.

Dr. BURTON. John?

Mr. LEWIS. I was referring mainly to the serious impact, high numbers of problems we see today. And, I admit there are possibilities of at least moral fault, forgetting legal fault on the part of the employee.

But, if we are talking about starting to cover these diseases that are either not occupationally related or questionably occupationally related, and if you are talking about looking at other systems for per-

haps models or instruction, we not only might, but you should well consider the New Zealand experience.

I remember when the National Commission was in business, the New Zealand model, the New Zealand studies were presented as real proposals for how workers' compensation should be dealt with. And that is through throwing everything into a 24-hour-a-day protection for everybody.

I think that what has happened in New Zealand, they found, when they considered transfer costs with regard to covering diseases as opposed to accidental injuries, the amount was so staggering that in effect they could not, either politically or economically, put it into effect. And I understand the situation there now is they are fighting over occupational diseases just as we are here, having to make a decision between occupational disease and nonoccupational disease.

Dr. BURTON. Dr. Berkowitz, do you want to comment on this?

Dr. BERKOWITZ. I think John got to the point. I don't think there is a country in the world today that is not faced with the problem of making a distinction because workers who are injured on the job receive either better coverage or higher benefits or from some other reason to make that distinction.

I think it is interesting, and John has already alluded to this, and we discussed it the other night, that the latest cases out of New Zealand could have come out of any worker's compensation jurisdiction in the United States.

The question is, is it reasonable to expect you got it from an occupation or part of the normal vicissitudes of life? They have allowed now, in about a half dozen of these cases, that it was in fact part of the normal vicissitudes of life and they will not be compensated under this New Zealand system.

Now, I think the logic is very simple and easy to follow there. I think John already sketched it out.

It is, No. 1. You want to do away with any distinction and make it as simple as possible.

No. 2. You can do this for accidents. An accident is easy to identify through time and place and you can do it with both automobile accidents and accidents on the job. So, you wipe out that distinction.

No. 3. You are not quite willing to go so far as to say we will cover all illnesses. And I would pose this question to Dick Schubert, in your second broad fund, what in the hell is the difference between my contracting a communicable disease or contracting one of the diseases that you spoke of here? And are you willing to put into the fund all illnesses? New Zealand wasn't.

No. 4. But—and this is always the big but—since occupational disease to some extent are so closely related to accidents, you can't exclude them. So, where do you end up—without occupational disease in, not nonoccupational disease out, and in a sense now beginning to get the same line of cases that we have in this country.

Dr. BURTON. I want to make sure I understand the Schubert plan.

Mr. SCHUBERT. I am not representing anybody.

Dr. BURTON. Are you putting diseases which are clearly nonoccupational into your second fund or is it just those diseases with a mixed factor?

Mr. SCHUBERT. With a mixed factor, where it is work related, and I recognize, from what Dr. Selikoff, and he was very convincing the other day, recognized the difficulty of even establishing that. But, that would basically be work related, as opposed to cases where the causation is so clear it fits into what Tom Mancuso said they can do.

Dr. BURTON. So you have three classes now. Clearly occupational—

Mr. SCHUBERT. I don't intend to cover nonoccupational diseases. None of the non-work related diseases, whatever that group is.

Dr. BURTON. Okay. Peter?

Dr. BARTH. I don't disagree with my former boss at the Labor Department. I think realistically you will find if you break the diseases down into three categories, very clearly occupational, the mixed bag, and clearly nonoccupational, and if you exclude the first set of these, it would be so trivially small, and we would be back for another conference.

I know Dr. Mancuso said there is clearly a relationship well established between certain substances and diseases. Unfortunately we get back to the issue of probability. If you know the possibility is twice as great for a worker working in a chromate factory or three times as great or six times as great, we still wind up in many instances compensating a person who isn't in that situation normally and gets the disease.

Unlike the point I think Mr. Anderson made this morning that the only problem we have in this area is really one of lung cancer. I think it should be expanded to include all the cancers of the urinary system. Clearly we have known that a long, long time. And then, I think, we have something like trial lawyers wetting their lips—clearly we have to think about cardiovascular cases and all of them. The books are full of them. Cases that honest men, could all, almost clearly identify as occupationally related, and yet almost certainly would not put it in the first category, but in the second category. Frankly, I think you get to a very small group, and the second category brings us back to—

Chairman BUNN. That is the point I was getting ready to react to. I think the flaw, if there is a flaw in what appears to be a rather, perhaps, simplistic way of trying to solve this problem, I feel what would happen is there would be a great effort to push the great majority of the cases into the second group, and then there would turn out to be very few cases that would turn out to be occupational.

Of course, if that is what society wants to accept, I think that is something we may have to consider as an alternative.

I am not trying to shoot it down right now. That is the caveat as I see it, that it is going to push the great majority of cases into that one section.

Dr. BURTON. Andy?

Mr. KALMYKOW. I think a lot of the points are very well brought out. And, in fact, all countries do make a distinction between work related and nonwork related regardless of what system they have. I call it workers' compensation regardless of how it is funded. I think that is one of the fundamental things here. I think—I won't use the description, but you make another area of dispute, whether compensable and noncompensable, and now there would be a dispute between

three areas—noncompensable, partly compensable—should we pay—and you know, there will be three people trying to shift the burden.

But, I mentioned yesterday in passing, and possibly that may not have registered too heavily, the possibility of handling it a different way.

One is allocating costs, which is part of the proposition that you mentioned—in other words, only paying for the degree which compensation contributed—performance contributed to the condition, which is a difficult problem of evaluation.

And the other is to make some arbitrary, more or less arbitrary rule to the degree to which employment does contribute. I think that is a much more valid, and if it is 50 percent or whatever figure you want to use, get in, and if the 50 percent is valid, and then whatever means are available for providing, take care of it.

You mentioned alternatives. That is a possibility I don't see what is wrong with.

Dr. BURTON. I am going to call on Mr. McMahan in a minute, but let me just make a comment here on some of the flack the Schubert plan has run into.

Mr. SCHUBERT. You kept pressing on us to come up with an answer.

Dr. BURTON. That is right.

Mr. SCHUBERT. Mr. Kalmykow has now adopted it and I am willing to change it to the Kalmykow plan.

Dr. BURTON. Maybe in the light of what is Howard's concern and Peter's concern, that there aren't many in the first category, we ought to not have a separate program for them. Treat all diseases the same. That is, have a general program, whether work-related or not, and if there is a permanent disability that results from a disease, then there is a system to deal with it.

You may want to, as a variation No. 6 on this, to say you have a general disease system that anybody can get into as long as they have a disease. In addition, if they want to try to establish clearly this is occupational they can go to the workers' comp system.

It is kind of a two-tiered system with very high standards of proof on getting into the higher benefits of the workers' compensation system.

Mr. McMahan?

Mr. McMAHAN. I want to defend the Schubert fund. I think the logic doesn't break down at all and I don't think the problem Mr. Bunn sees would occur either.

The reason it will likely work is the differential in payment. I think there should be a much higher benefit for the purely occupational disease. By definition, those that fall in the second category to some extent the cost would be borne by the victim to an even greater extent, anyway, so if those costs were lower in the second category, the pressure would be identify, to the extent possible, those diseases that are truly occupational.

The proportionately lower payment in the second category, I think would prevent a great number falling into that category. Also would automatically impose the non-occupational costs back on to some other sector of the society. I think also such a fund will be a real challenge to the inventiveness of the insurance company that they could come up with a system to implement that.

Chairman BUNN. I would like to rebut that and say the scenario that would develop—I think what would happen in reality and looking at it in the cold facts of life, the employers would tend very much to try and push as many cases, if at all possible, in that group that has lower benefits. It gets the monkey off their back.

Any I think you are right, the employees would be trying like the dickens to get into the higher benefit level.

What I would perceive would happen, is what Andy referred to, you add an area onto a system that is already overburdened with litigation and this just adds a new pocket of litigation to get into.

You are an expert in the black lung area, and I think there are some analogies that can be made in what happened in the two-tier approach in the black lung program where employers tried to relieve themselves of as much of the financial burden of the black lung program by getting in under the early stages where they didn't have to actually bear the cost themselves.

So, I see some parallels of a considerable amount of litigation where you have a lesser benefit program—I know the realities of life, and I think you open up a new field of litigation.

Dr. BURTON. We have several people stacked up here. Dr. Roberts, did you wish to say something?

Dr. ROBERTS. Yes. I like the first half of the Burton plan, and I would like to speak in defense of it. I wish though he had stopped in the middle.

We are dealing with a matter of probabilities all the way along this whole consideration.

We take issue with Tom about perfect knowledge, about the occupational nature of almost any of these diseases. What he means is we are almost positive in some cases. For example, mesothelioma in asbestos workers. Some people get mesothelioma without being asbestos workers. It is admittedly rare.

Angiosarcoma—some people get that without being vinyl chloride workers. It is admitted.

You take one of our people that is traveling to a foreign area who gets hepatitis in a European city. Well, the incidents of hepatitis there is 10 percent higher than in New York. So, he is at a slight risk. If we want to quibble about 10 percent, make it 20, 40, 80, 200, or 300 percent—at what point does it become logical to consider it occupational?

When it comes to diseases, I think you are going to deal with a question of imponderables less difficult to decide in the case of mesothelioma in a long exposed asbestos worker. You can be assured to the—I don't know, whatever you want to put on it—you can be almost positive this is an occupational disease.

In some other on the list Tom has you can be almost positive.

For example, Tony talked about the, studying the cancer incidence. That is fascinating, and there is little doubt about the fact they have relevance to the topic we are talking about. But, when you talk about the incidence of cancer in the family members, the females are not at work, there is not the question of asbestos being carried home on the clothing or something of that sort, you will find a sort of parallelism and that many of the females who are not employed have the same extra risks in these counties.

Now, in Great Britain and Wales, for ages before we have started to, they have kept mortality experiences accurately recorded by social classes, dividing the whole population into five social classes. But, their social classification is done on an occupational basis.

Now, very interestingly with respect to many of the diseases where we would focus our attention, and say, ah, we found something, the incidence is exactly the same in the spouses of the worker.

So, I think we are working with such complex things, where many things are environmental, many of them social, and many other considerations, we gave in a little bit on the point back there that maybe workers contribute something themselves.

But, there are instances in which it goes beyond the OSHA requirement.

For example, in the coal mine case, coal miners can elect not to have the chest X-ray that might discover the developing disease, and elect to continue to work at the base of the mine and elect to develop the disease. Even under OSHA the Secretary of Labor can require us to offer the examination, but he does not have the right to require employees to accept examination that is intended for their protection.

So literally, I think it is so complex I have to think the only way to have a soundly scientific solution to it some day, is when we don't have to distinguish between it, and I am not trying to get that cost off industry's back, I am just thinking society will be better off when we are not bogged down into trying to differentiate between what is occupational and what isn't.

My concern then is how do we make management behave responsibly if they don't have anything extra to pay if they caused something literally themselves.

Dr. BURTON. You can't have an experience rating on a system of particular benefits to workers of that firm for all diseases in regards to the kind of diseases on the assumption that some diseases would be random in the population, and therefore, would be randomly costed out across the employer to the extent diseases workers were getting were due to that particular workplace. That would be reflected in the experience rates and it would provide a possible inducement to reduce those exposures, or whatever it was, within the firm.

Just to clarify this a little, I think we have a variety of plans floating around. And just for shorthand and to repeat what we have—we have the Schubert plan, which, as I understand it, has a three-way distinction among diseases: that is, clearly occupational diseases would be compensated at higher benefit levels, diseases of mixed factors would be put into a separate plan with lower benefit levels, and the third category, those clearly nonwork related at all would be outside the system entirely.

And I had a couple options of my own. I guess Burton option No. 1 was the question of covering all occupational diseases.

Mr. SCHUBERT. That is the status quo camouflaged by the Burton-Bunn name.

Dr. BURTON. I don't think that is true. It is certainly not the case that purely nonrelated cases are compensable under workers' compensation.

Mr. SCHUBERT. You weren't suggesting nonwork related diseases be compensated, were you?

Dr. BURTON. I am taking an extreme position—I am not really—this is just a point of discussion—if you can visualize a system where, if you got a disease and were permanently disabled, you are eligible for benefits. We don't care if it was work related or not, you are entitled to benefits. I think that is the one Dr. Roberts was endorsing.

The second thing I said was you might want to do that, and in addition have supplementary benefits with the worker to carry the burden of proof that he clearly had a work related disease and he can get back in the higher benefit system.

But, I think the one you reacted to was the one that said that all diseases regardless of origin, work related or nonwork related, are eligible for benefits.

And now—

Mr. GLANCY. I would like to talk to the Dick and Andy plan for a moment. I think what you are talking about is if somebody has asbestosis who has a definite work relationship, he would be in class one.

And somebody who might have asbestosis and can't prove they were associated when the maintenance man came over and ripped open the insulation or was a sidewalk superintendent and got it from the beams, but he cannot document it.

And in the third class, some other diseases.

Is that a fair statement of what you are talking about—

Mr. SCHUBERT. I guess so. I am not really sure—it seems to me the two problems with the status quo as modified by John and Howard is, one, that it invites distortion in the system to accommodate pressing social needs.

It invites additional black lung encounters for red lung—after all, there are some very influential people, including conservatives, who are pressing to do the same kind of things for other diseases.

No. 2 is where I take issue with Dr. Roberts, and he is more likely to lose his job now than I am—I think it does unfairly stick the employer in certain industries with what could be highly counter-productive costs.

Chairman BUNN. Let me say I am not trying to—I don't think the status quo, and that is the whole purpose of the conference, I am dissatisfied with the status quo and I was just reacting to specific plans as they were presented, particularly the options in what I saw problems with.

I would be the last person to say that I am happy with the status quo at all, and that is the reason we are toying with certain options.

And I was pointing out the flaws or problems I saw in the particular proposals you had.

I think in reacting to the exclusive idea of carving O.D.'s totally out of the system, and setting up a special fund irrespective of whether occupational or not, I think the criticism you will find, if you totally carve it out, if going to be, there will be a great hue and cry, I suspect, from labor, to the fact you are discriminating against the people that have occupational diseases vis-à-vis accidents.

As I say, I am just reacting to things, and sort of being the devil's advocate, if you will.

And I think now Dr. Howe has something he would like to say.

Dr. Howe. I have been listening to this with great interest. In the earlier stages in workers' compensation, you are all familiar with the fact of the schedule of diseases that were compensable by the name of the disease. You have thoroughly destroyed that in the last half hour.

And the other thing that impresses me is I am not at all certain when you take the total of occupational diseases, when you get a recording system, you are not going to find out that there are acute toxic exposures which produce illness for a few days or a couple weeks and then the man goes back to work. Which, usually are compensated automatically—they happen on the job and everybody agrees they do. I have an idea that is, and I include in this the dermatoses which are very common, and I can't give you a statistical figure that will stand up, but we all know from our own experience in industry how common all of these are, all of these are occupational diseases.

Also with the wrangling that is going on between environmentalists and occupational people, it is becoming apparent some of the same exposures, toxic exposures which produce acute illness, can probably in low dosages over very long exposure produce some completely different diseases—with the same substance.

Here again, if you were going to stick to specific exposures, specific toxic hazards in a scheduling kind of thing, you would be dealing with different diseases. And furthermore, some of the same diseases are incurred in the workplace and some, or both kinds, are also incurred at home or in the community.

I think—we have spent practically the whole conference on the long latent period diseases, which I agree are the difficult problems from the standpoint of litigation. We may have overlooked the frequency of the obvious—acute toxic diseases as part of the occupational disease picture, which I fancy are probably almost as big a proportion of occupational disease as the minor accidents are in traumatic injury.

And if you are going to have a balance in the handling of occupational disease, I think you can't fail to consider the acute toxic exposure—the fellow who gets temporarily overcome by exposure—he goes into a tank to clean it and is overcome and has to be rescued and is hauled out, but he is back to work in 2 weeks—

Some of these substances may be the same. I don't think you can get acute exposure to asbestos, but you certainly can to carbon monoxide and you certainly can to chlorinated hydrocarbons.

These things should be joined together and you shouldn't forget in trying to discuss separate systems, you are not in the business of scheduling specific substances as the basis for a particular manifestation of toxicity to that exposure. We mustn't get caught in the trap of saying that X chemical is to be considered occupational, even though it can be incurred at home, or in the lobby or—you will have to distinguish whether an artist or sculptor is working in his garret, is working there for his amusement or for his job, and gets involved with solvents and pigments and what-have-you in an ill-ventilated garret—but the thing that has impressed me is:

(a) We should be sure that we consider short range toxic exposure as occupational diseases, obviously they are on the job, and;

(b) Let's not get back into the business of a schedule of named diseases that we consider always occupational.

Dr. BURTON. Mr. Solomons.

Mr. SOLOMONS. I would like to propose an amendment to the Schubert plan—I am sorry, Dick—I think as a practical matter the second category which Dick outlined may be something we are going to be stuck with insofar as the retrospective problems are concerned.

Many States, as the laws stand today and I am speaking of the constitutional laws of the States, cannot provide retrospective workers' compensation benefits to people within those States under those laws.

I think that the black lung experience is one indication that Congress is not about to do that, require the payment of employer financed benefits for these retrospective claims. It didn't do it for black lung, and we are talking about a potential \$100 million liability. And I think it is outrageous to think Congress would do that in any industry when you are talking about a liability which may be hundreds of billions of dollars.

So, insofar as the particular claims are concerned, the old time exposures and diseases which have already manifested themselves, there is no way those are going to come into the workers' compensation system. There is nothing we can do to put them there.

What we are talking about is some kind of welfare, so, I think what we are talking about is some kind of a welfare program, not necessarily federally financed, but some kind of publicly funded welfare situation.

Insofar as new claims are concerned, new manifestation of diseases are concerned, working within the context of the best possible laws we can put together—I think the black lung law provides some indication of how you might put together a pretty good law—I think many States through their judicial decisions and through amendments have developed laws increasingly better so far as occupational disease compensation is concerned.

And in light of that, and on the background of that, I would like to go back to something that was said either yesterday or sometime—and that is the best way I think to deal with these kinds of occupational disease claims, rather than trying to do something like—saying perhaps 20 percent should be paid by industry and 40 percent by somebody else and maybe 60 percent by somebody else—is go back to the system we have, which really isn't all that bad. Although it has not provided a great deal of interest and one of the reasons for that is people are not into the system, and for another, the State compensation laws have not been revised to the extent they could be revised.

And I am talking about—I think the use of presumptions or medical boards, or whatever, or definitions, may be appropriate if evidence can be presented to the legislators that indicate the appropriateness of them.

But, I think what we are really down to here is using the adversary system, which I think is really pretty good, given a good law, and letting people put on their best evidence. That may be the point we are at now. I am not sure I have been convinced by anything said here in this conference that we have really gone beyond that, that any arbitrary solution to this problem is going to be very effective.

Dr. BURTON. Doug?

Mr. STEVENSON. As Mr. Bunn pointed out, in the world where we have been, there will be just as much litigation because everybody will try to get into the higher category and if they can't they will fall back to the next one, and all the money for—litigation costs, administrative time—could be devoted to something else.

Second, you presume to separate a person that has an occupational disease from another person, and I ask why. Why, from the standpoint of society should a person's inability to breathe that stems from occupational factors be regarded any different in our society than a person whose inability to breathe stems from emphysema, a completely nonoccupational disease? Is one more laudable than the other? Has one led a better life? Or are you really inflicting some kind of punishment when you say one should get more than the other? I see no reason for a distinction as to how you compensate one as compared to the other.

The real question is, are they disabled from performing economic benefits in our society and, therefore, have to be taken care of. I don't see the distinction between one from the other from the standpoint of society—one is the same as the other.

Dr. BURTON. I think below the surface there is an element of fault.

Mr. STEVENSON. OSHA can take care of that.

Dr. BURTON. Well, maybe it does need to be refined. Mr. McMahan?

Mr. McMAHAN. The distinction is the same distinction that was pointed out by Mr. Lewis. One is a wage replacement plan. If occupational, you deal in wage replacement. The second category is made up of people that otherwise would get nothing. It is a partial listing of costs that otherwise would be borne by themselves. That is the distinction.

Dr. BURTON. Mr. Guy?

Mr. GUY. I am not sure I understand, Mark. I gather from his remarks, he implied the employer will not be stuck for the old cases. That is not true under part C of the Black Lung Act. Employers are now being asked to pay for cases that haven't been in the mine in some cases for 30 years.

Your argument doesn't hold, Mark, I don't think.

The silicosis cases and the asbestosis cases that Dr. Selikoff alluded to the other day, those cases right now are fully compensable under the Longshore Act. Employers and insurance carriers are paying those cases right now. We are paying mesothelioma cases that occurred in the 1940's that have not had one iota of exposure since 1944 or 1945. Those cases are in the system. Let's make that clear.

Mr. KALMYKOW. I think that is absolutely correct. It is true not only in the Longshoremen's Act, but a lot of other acts as well.

Mr. GUY. It certainly is.

Mr. SOLOMONS. May I respond?

Dr. BURTON. Yes.

Mr. SOLOMONS. I am talking about old cases—I am talking about cases that manifest themselves sometime before passage of an act under which they might be covered. If you don't want to pay for cases, I would think that could be ferreted out by some kind of arbitrary limitation, given the time of employment—and I think you are talking of an entirely different issue.

All I am talking about, my dividing line, is cases which become manifest within a reasonable period of time subsequent to the extension of coverage, and cases which manifest themselves before that. I don't accept your dividing line, I am establishing my own.

Mr. GUY. Compensability vis-a-vis the exposure—can be adjusted by legislation.

Mr. SOLOMONS. Cost is an important factor—

Chairman BUNN. I think at this point the moderator will attempt to summarize the conclusions that have been reached.

Mr. Burton.

Dr. BURTON. Well, I think it is pretty obvious we don't agree on the solutions to the various problems that have been raised. I do think the exercise has been valuable in defining the issues that are involved in compensating diseases. And it indicates some possible solutions, many of which I suspect after we have a drink or a good night's sleep we will all want to disown. My plan two, for example, I am willing to put somebody else's name on almost immediately. But, some of the other ideas kicked around here, I think, may have some basis for further looking into. You have obviously thrown out some ideas that transcend the traditions of workers' compensation.

I would have to say if the problem of occupational disease is as serious as many of the commentators have suggested here, it may well be that it is an inevitable task that we are not doing workers' compensation a favor by ignoring a problem which cannot be handled within the traditional framework.

I will repeat some of the other comments made before. It seems to me we have been talking about various types of diseases, ranging in a spectrum from those which are clearly occupational, and I think Henry Howe made an important contribution at the end by noting there are some types of diseases which are almost unambiguously occupational, which have an almost immediate consequence on the workers, and I suspect this is one type of disease I would have some trouble putting in the Burton plan No. 1, as opposed to the Schubert plan. You would really have difficulty saying somebody who fell over this afternoon from fumes and was out for 3 weeks would not be considered to have an occupational disease.

The other extreme is clearly nonwork related diseases, which there are possibly two or three. I am not sure we identified any of them very well here, because every time I mentioned something like childhood diseases, somebody immediately has an example where somehow or another that is work related.

The bigger question mark concerns that intermediate category which appears to be by far the largest in terms of number of diseases. That is diseases of multiple factors. Some of these factors are environmental, some work related, some hereditary, some have long latency periods and some have short latency periods. And, it seems to me that is the real challenge to workers' compensation—what to do about this class of disease.

One possible answer to this is to consider the traditional task to give workers' compensation that the disease has to be arising out of and in the course of employment. And this is certainly, I suppose, consistent with the National Commission's recommendation, similar to

the Model Act put out by the Council of State Governments. Essentially it becomes a case by case determination process, where facts are considered by an administrator who must decide under the circumstances whether he considers this to be work related or not.

We all have some concern about the use of that approach in the occupational disease area, especially for some classes of diseases which are work related in nature, it becomes more problematical.

As alternatives to using the standard approach of "arising out of or in the course of employment"—would be the use of presumptions. It would draw on scientific evidence too, in effect, take advantage of the probability that exists in a large number of cases, that 20 out of 30 people who get a particular disease in a particular class got that from a particular factor—in a sense, digging down to the individual case level by drawing presumptions that a worker with that disease did in fact get it from a work related factor.

There are obviously some problems with that presumption, and several people have noted, if they are drawn in a matter which makes them almost irrebuttable, then we have to find a work related disease. There are several instances of talking about legal diseases, which I assume is a shorthand way of saying, in effect, we created a class of cases where compensation is made, regardless of the underlying medical factors.

Now, it seems to me if we are going to restrict this to the traditional workers' compensation program, in these classes of diseases where there are multiple factors, those are some of the choice that are available. Not the only ones, but certainly these would be some of the more obvious alternatives: Defining the disease, creating an assumption, and relying on traditional "arising out of and in the course of".

I think the important thing that has come out of this conference is the thought of having certain ranges of diseases, particularly diseases with multiple factors—of trying to see if we can't play-down the reliance on the work related test, or possibly eliminate it. This is obviously the essence of the Schubert plan, if we can use that term once more.

I don't think we have really begun to explore all the possible implications of going that route. We did mention the fact if you begin to compensate diseases without regard to cause, then you need to re-think some issues like, what are the appropriate level of benefits? I think this goes to some of the concerns Doug Stevenson raised, Dick Schubert raised, and I would have as to whether or not the level of benefits in workers' compensation are appropriate for a program that would provide benefits to workers with a disease regardless of the cause of that disease.

Dick has been concerned about what the cost implication would be for the employer, whether or not they could bear it. And, I think, that is, of course, an issue to be considered.

And as a related part of that particular exploration, one would have to, I think, reexamine the issues as to whether or not the cost should be borne entirely by employers. If you go to, let's say the Schubert plan, there is no reason why you would have to make that a component of workers' compensation or use the traditional workers' compensation methods to finance it. You may want to go to a joint financing of employer and employees. And indeed, you may want to have some public

support going into that program. For instance, that which has been established for certain parts of the social security program.

But still another aspect of the costing out of this kind of program would be to examine to what extent we want to compensate for diseases which manifest themselves after the worker is retired. This is, in the traditional workers' compensation program not a major problem, because obviously most injuries by definition involve someone currently in the workforce. But, with diseases, and particularly those diseases with long-latency periods, we have to think through the case of, supposing someone does get an occupational disease which doesn't manifest itself until he is 70—do we want to make this compensable at all? It is not immediately obvious to me that we do. Perhaps we would want to take care of the medical part of the thing, but it is not clear that you would want to provide wage loss benefits in an instance where the loss by definition would not be a loss of wages.

This is a problem in workers' compensation cases that is beginning to emerge in States like Michigan where there is substantial cost thrown into the system by workers who have already retired filing an occupational disease claim and receiving substantial awards. Before we want to set up a general system for compensating disease, that issue should be very carefully explored.

Finally, if you begin to think about alternatives to workers' compensation—a new system for dealing with disease—then another kind of need to be faced is whether you want to go at that on a categorical basis or not. I had mentioned, I think yesterday, it is possible to think about taking out a particular kind of disease, like heart disease, and making that a disease you begin to compensate regardless of the source of that disease. Ron Conley raised objection to that, and properly so, that with heart disease there may be an interaction with respiratory disease and so on, and you may not want to have separate programs dealing with separate parts of an individual person.

So, maybe it is not practical to go to a particular program. On the other hand, it may not be necessary to go all the way in terms of a general disease program. Perhaps you would not confine it just to heart, but perhaps you would confine it to a number of diseases included in the diseases to which benefits are payable regardless of their cost.

I think we have given, through this discussion today and over the last 2 days, we have given the task force some questions and some possibilities which they can deal with, and we also laid out a range of issues which can be solved for us on the spot by Mr. Berkowitz, because he is given the responsibility of trying to pull this entire conference together.

Dr. BERKOWITZ. You mean it is my turn now.

I think we began this conference, as you will recall, with Paul's message to the Corinthians. I hope we have in the couple days we have been here approached these problems with a great deal of faith, certainly with a lot of hope, and I suppose when we get back home and read over what we have done, we will need all the charity we can get.

And as I look around I think we are ending this, not with a message to the Corinthians, but rather with an address to the departed, possibly an address to the dear departed. And, if it is a funeral we are at,

the question is at least interesting as to whose funeral it is and whether we are witnessing the last rights for workers' compensation as we know it.

But, let me begin at the beginning and recall to you that the first issues that came before us had to do with the question of definition of occupational disease. And I think, as John would say, I also think we did reach some consensus.

That always reminds me a bit about the fact the National Defense Mediation Board in 1941 broke up because of their inability to resolve a union-shop issue. And Roosevelt reconvened a labor-management conference and said, now, go ahead and meet as we have been meeting and come out with a set of principles with which we can constitute some sort of new mediation agency.

And then they met and they clearly couldn't agree. Again, getting hung up on the issue of the union shop. It was at this point Roosevelt sent a message to them, "Thank you very much for your deliberations. I am glad you agreed on the fundamental principles and I am now establishing a labor board."

And the thing that had happened was a small incident on December 7, 1941, which occurred prior to the time they began and the time they reported in.

I thought we ought to have reference to the fact constantly, as we have had for the last 2 days, that we may be sitting on a potential time bomb and there may be in fact crises at work.

I think consensus did possibly emerge along these lines: that there are at least three different definitions that are useful and necessary and I think quite compatible.

One is, we need a fairly loose disease oriented type of definition—pathology-oriented type of definition, as it were, for the purposes of Irv Selikoff, Tom Mancuso, Dr. Roberts and the other physicians who are really interested in an early warning system. They are interested in medical surveillance. They are medical detectives as it were and they don't need very much in the way of evidence to get their suspicions up and go out and look at what is happening. We need data like that for that purpose of fairly loose definitions.

On a second level it seems to me what we are talking about are types of definitions of occupational disease, and here again we are still pretty much pathology oriented, although we are moving over to look at least at impairment, which would be useful to NIOSH, OSHA, EPA, for the purpose of setting standards, because they again are interested in prevention, and there is no, not quite the same sort of legal liability, though, of course, we are moving into that possibility once standards are established.

Third, we need a definition of an occupational disease for purposes of workers' compensation or something like workers' compensation. And I think here we get into a situation that this is relevant only when the active pathology involves some impairment or disability. And I want to talk about that later, that we are possibly moving into the area of something like "arising out of or in the course of"—and let me set that aside for a moment, with the conclusion I think these three levels of definition are quite compatible and I think it would be a mistake to view them as one, when in fact there are at least three.

The second area had to do with the magnitude of the problem. What is out there. And I think here we clearly saw, dramatically saw such differences of opinion as to how and what is possibly out there. And Nick Ashford's paper being a good example in general—and Irv Selikoff again—Tom's paper—show the possible magnitude of the problem out there. And we compare that with what we do know about what the workers' compensation system is now taking in. And I think we ought to dwell on that.

I am willing to concede that much of what Nick Ashford put together may be based on relatively soft evidence.

I am willing to concede that there may be a lot of errors being made. But, I do think that despite differences in estimates of magnitude of the problem, we are forced to the conclusion that workers' compensation is not now handling the occupational disease caseload which is in fact out there now, which has been out there, and certainly not that which will be out there. I don't think I have to say there is an occupational disease epidemic in order to reach that kind of conclusion. Neither do I have to agree that there are in fact hundreds of thousands of deaths per year. Or \$370,000 cases. But, Andy tells us, and other people here, that in workers' compensation we are getting possible 2 or 3 percent of the caseload, lost time cases. I am saying we ought to be satisfied to conclude that workers' compensation is not now taking care of the occupational disease cases that are out there now.

Therefore, let me move on then to ask this kind of question which I think we have been dealing with today. If there are discrepancies in magnitude, then I think workers' compensation should cover them, or we ought to move to some other system, whether it is—Burton's system, Schubert's or whatever.

The way I would like to approach that is to see whether I can jot down and sum up some of the things we have said over the last couple days in this fashion:

What are the arguments for including occupational disease in the workers' compensation system as it exists? And then I want to go on to say whether I can talk about the kinds of changes that might be necessary in the workers' compensation system if in fact it would do the job that presumably we want it to do.

One argument for including it in workers' compensation is a point that Dick Schubert made, and a number of other people did as well, and that is it is just not politically feasible to take on the whole program. You can't take on the world, and possibly by extension we recognize the difficulties of taking on new programs. Workers' compensation is a system in place and it is used to deciding these cases.

Second, there has been a reluctance to move on to new programs, especially those that might be, as John Burton just talked about, categorical in terms of single diseases because of the black lung program. Now, I think the black lung program—neither condemning it or praising it—is certainly an instructive one. And we all should be indebted to Nancy Snyder and Mark Solomons for their paper, which I think was a marvelous look at the program itself in an objective fashion.

If you look at the black lung program it tells you the fact if there is a need that arises, as somebody sees it, it doesn't make any difference if that data is there or not, a crisis was defined and Congress did

react. Now, that has been said here several times and we ought to keep saying it over and over again because I think that the kepone case is illustrative of the amount of publicity that can be garnered by relatively few workers in one plant, none of whom have suffered fatalities, all of whom have been compensated, some of whom didn't have permanent disability, et cetera—yet, if you think of the kepone incident magnified, you can see the dramatic values inherent here.

And then you look at what happened with coal miners on Congress, and I think you come back to the facts, if a need is there, crises are defined, Congress reacts. Now, that is one lesson.

I think there are other lessons in the black lung kind of thing. One is if you look at it purely—let's put it this way—this is the kind of discussion that gets you into trouble with economists and noneconomists—but if you look only at the equity aspects of the program, they are unassailable. Who is there among us to say a coal miner who spends time in the mines and has a disease should not get a modest level of benefits? No one would disagree with that. Who is there among us that would say a coal miner that lived in an isolated region should be denied benefits because of the fact theoretically a job is available somewhere else? Who is willing to say that?

And if you follow each one of these equity statements and you agree with each one, I think that doesn't prevent the conclusion you might end up with a ridiculous, ludicrous situation where you have in fact a legal disease—where, in fact, I think the situation is very inequitable, if we contract their situation with that of the worker in the neighboring industry or in the neighboring geographic area.

Let me suggest to you, however, that is not yet the heart of the problem. That the acid test of the black lung program lies in the future. And it will come—and I think this goes to the point that was raised today, as we begin to get back to really fundamentals, and it kind of surprised me to hear the issue raised again as to why it is we want to pay more to a worker who is a victim of an occupational disease versus the worker who has an ordinary illness and so forth. I thought we solved that some years back.

But, nonetheless, I think the acid test in the black lung program is going to be in the future. When we get to this point, can the reduction of dust levels, if in fact they do come about, reduce the incidence of the legal disease as the population in the mines continues to age.

Is there anything that the employer can do in terms of industrial hygiene, in terms of safety practices, in terms of whatever it is, available to him, that will reduce or minimize the events that give rise to eligibility for the benefits?

Now, the answer to that is no.

Then, the black lung program must be adduced as a failure, and I think it is possible to move onto any number of other ways of compensating coal miners through other systems.

I think there are many other experiences of black lung that we discussed and that provide lessons for us, and perhaps if we had more time we could get into them.

I think there is a third argument for inclusion in workers' compensation of occupational disease, and that is that whatever the defects of workers' compensation, it is a method of distribution of goods. It is an

allocation device. We may not like the way it operates entirely. I know small employers are not experience rated, but there is a method for doing that. And I don't want to say more about that except that is the kind of thing, if we had time, we could inquire into whether or not that is the optimum method of allocating costs or whether there are others. All I am saying to you is that it is a method and at least it is an incentive in the right direction.

Fourth, and this is a point Mark Solomons' alluded to again today—workers' compensation is a system for making decisions based upon the best available evidence. And, I submit, that is about the best one can do if you don't want to go down the black lung route, unless you come up with a great deal more information than we have now available to us.

Again moving on a for a moment to assuming, just for the sake of argument for a moment, that we do go down the route, say these things ought to be included in a system of workers' compensation. Then, I think we have to face the fact that things have to be done now in workers' compensation. And, I think that there are three levels of things that have to be done and we talked about around this table in the last couple days.

First of all, and it is a relatively easy thing, and I don't know how to say this other than the way it was said—but I don't want us to lose sight of the fact there are States where the definition of an occupational disease is such that no disease—very few diseases—can come into the system. What is necessary is relatively simple. It is to have a definition of occupational disease along the lines of the Council of State Government's definitions which put it on all four squares with an injury except in cases where there is the possibility of work related cases where there can be shown an increased risk in the incidence. And there are problems with the statute of limitations—there are problems involved, and a whole lot of problems were dealt with adequately in the National Commission report.

What I am saying is, if anybody is serious about including these things, occupational diseases, into workers' compensation, it is at least the first on the list of things that must be done and that are not now being done in all of the States.

There is a second level of things that have to be done, and I would fix great emphasis on the fact—I think Howard Bunn alluded to it time and time again—that the cases first have to get into the system. And, I think we ought to be clear that the system begins with a report to the employer or to the carrier and to some claims adjuster, and I believe that the changes that have to be made here—and bear in mind I am talking about changes in the workers' compensation system and not anywhere else—the changes that have to be made here are fairly difficult to do. I think it requires a system of positive administration. I think that it requires us to know a little more than we do know now about what is going on in the system.

I would point out to you—and if it were not so late, and I suppose it is fortunate it is so late—I would suggest to you what the system requires is a data system. And that we ought to know—I think it is patently disgraceful that we have been sitting around here for 2 or 3 days and we do not know with a certainty what cases are going through

the system. I would suggest to you it is possibly equally ludicrous that the workers' compensation administrator does not react to the information he has available to him.

I am thinking for example of the National Cancer Institute Atlas; I am thinking of some of the information that has been brought to us by the physicians around this table.

It seems to me if workers' compensation wants the job, then it is necessary for them to gear up to do it.

The OSHA reports, for example—however deficient they may be—require the employer to report when a worker is moved from one job to another. Under any kind of a data system that ought to now be in place, and certainly hopefully will be in place before too many decades are past—reports of this would filter into workers' compensation. They would know from these data a little bit about what is happening here and they would know what cases are coming in and what cases are not coming in.

It seems to me—this is what I am trying to say and I think we have been talking around this point—that the early warning system is something that ought to concern people other than Irv Selikoff—it ought to concern the workers' compensation administrator, if in fact they are going to do the job.

We just can't be continuously rearranging the deck chairs on the *Titanic*.

It is necessary to move into this, and I think, when I am told that safety is not a concern of workers' compensation, that this is not their bailiwick, I would hasten to remind you this is one of the original objectives of workers' compensation when the job was given to them originally.

I think if these two things can be accomplished, there is certainly a third level of things which can be done, and that gets us to the guidelines, the types of guidelines—whether or not we can get a system which will meet the needs of medical surveillance, biological monitoring—whether the workers have a need to know and right to know—whether, if these data and information are available, then it seems to me it should be possible to develop guidelines or even presumptions.

We don't have to go into that. John Burton covered that with you this afternoon in trying to talk about the various possibilities, whether you do it on the balance of probabilities or what.

But, I would suggest, however, that workers' compensation, if it is going to do the job, and I obviously—I suppose if you were to press me on this I would argue maybe it ought to have an opportunity to do the job—maybe changes ought to be made—that I suspect we need a little more experience with these things before we rush in with a particular type of guideline. But, then it may well be, the way the world operates, it is sometimes necessary to do the second things first.

Realistically I just suggest to you if the theme of the conference, and our discussions have been, workers' compensation and occupational diseases, then at least we ought to give a good deal of thought to these kinds of changes that I think must be made in the system if in fact they can do the job, if in fact they ought to do the job that has traditionally been theirs.

I would suggest to you further that there are a great deal of advantages to putting the problems into a system that in fact is in play.

Let me say in conclusion that it has been traditional in each conference dealing with workers' compensation, and to conclude each research article written on workers' compensation, with the observation that workers' compensation is a system that is at the crossroads.

Now, I suspect what we are saying now is that in spite of the fact we have said it before, time and time again, that we are now dealing with a very real challenging problem that is dramatic enough to cause the concern of legislators—people who are in a position to really pull workers' compensation's tail out by the roots.

Now, I think if that is so, all experience indicates that if workers' compensation doesn't bite the bullet, then Congress will act.

Now, I am not saying that workers' compensation will absolutely go away. It may well be the slogan we ought to conclude with is not that workers' compensation is at the crossroads, maybe the slogan should be perhaps, old soldiers never die, they only fade away.

I would suggest to you unless we get hold of this one, and I think we ought to congratulate Howard Bunn and his Task Force for holding this kind of a conference—for being willing to gather people here to sit down with diverse interest groups—diverse disciplines—and to frankly talk about the issue for 3 days, 3 long days—that we owe them all a debt for bringing us here together because surely we are dealing with an issue, which, if we don't solve, then the system that so many of us know, will, if not die, certainly will wither away.

Thank you very much.

Chairman BUNN. Before we bring it to a close, I appreciate very much your kind remarks on behalf of myself and my staff.

I want to thank in turn each of you for taking the time from your schedules. I know many of you made, not only professional, but personal sacrifices to be here. I refer not only to the panelists but also to the people who have attended in the audience.

I want to conclude on the same note we began on. There was a lot of work that went into the planning of the effort that has just concluded. The planning group, the original people who were in on the planning group, I think did an excellent job. And the staff, and particularly some key people at the Task Force, and I want to once again mention their names: one is Ms. India Wimberley, who for the most part has been upstairs manning the desk, and also, she was helped by Ms. Gerri Minor.

But, the person I think, if we can adjourn on a note of appreciation, who has spent literally hundreds of hours preparing and doing all kinds of work, and I think particularly the panel members know this—is Ms. June Robinson who is seated to my left.

I consider her to be one of the most able people I have known in any professional endeavor in which I have been connected, and this conference, if anything else, is really a tribute to her.

Thank you very much.

[Whereupon at the hour of 4:10 p.m. the conference concluded.]

APPENDIX

Report of Proceedings
Interdepartmental Workers' Compensation
Task Force

CONFERENCE ON OCCUPATIONAL DISEASES
AND WORKERS' COMPENSATION

February 10, 11, 12, 1976

University of Chicago
Center for Continuing Education
1307 East 60th Street
Chicago, Illinois

TABLE OF CONTENTS

Page

Agenda of the Conference

Transcript of Paper Summaries
and Discussion

Papers (full texts)

Biographical Summaries of Panelists

Interdepartmental Workers' Compensation

Task Force

Conference on

Occupational Diseases and Workers' Compensation

February 10-12, 1976

A G E N D A

Tuesday, February 10

9:00 A.M.

Opening Remarks -- Chairman
J. Howard Bunn, Jr., J.D.
Director, Interdepartmental Workers'
Compensation Task Force

Introduction of Panelists and
Explanation of Conference Format

9:30 A.M.

Welcome - Morton Corn, Ph.D.
Assistant Secretary, U. S. Department
of Labor
Occupational Safety and Health
Administration

9:45 A.M.

Issue Area One - Magnitude of the
Occupational Disease Problem

Moderator: John Finklea, M.D., M.P.H.
Director, National Institute
for Occupational Safety
and Health, DHEW

Summary of Paper: "The Magnitude of the
Occupational Health Problem"
Nicholas Ashford, Ph.D., J.D.
Senior Research Associate,
Center for Policy Alternatives
Massachusetts Institute of
Technology

- 2 -

Discussants: Philip E. Enterline, Ph.D.
Professor of Biostatistics,
Graduate School of Public Health
University of Pittsburgh

Donald V. Lassiter, Ph.D.
Special Assistant for Health
OSHA
U. S. Department of Labor

David P. Discher, Director
Center for Occupational Health,
and Safety, Off., Research
Operations, Stanford Research
Institute.

10:30 A.M. Coffee Break

10:40 A.M. Roundtable Discussion

Audience Questions and Comments

Moderator's Summation

12:15 P.M. Lunch

1:30 P.M. Issue Area Two - Medical Aspects of
Determining Causality

Moderator: Norbert J. Roberts, M.D.
Medical Director
Exxon Corporation

Summary of Paper: "Multiple Factor
Interactions in the Causation
of Occupational Disease"

Irving J. Selikoff, M.D.
Director, Environmental
Science Laboratory
Mt. Sinai Hospital - New York

Discussant: Ernest M. Dixon, M.D., Sc.D.
Corporate Medical Director
Celanese Corporation

Roundtable Discussion

3:30 P.M. Coffee Break

3:40 P.M. Audience Questions and Comments

Moderator's Summation

- 3 -

4:00 P.M. Summary of Paper: "Medical Aspects" -
 Thomas F. Mancuso, M.D., M.P.H.
 Research Professor, Occupational
 Health, Graduate School
 of Public Health
 University of Pittsburgh

Discussant: Sheldon Samuels
 Director, Health, Safety and
 Environment
 Industrial Union Department
 AFL-CIO

Roundtable Discussion:

5:30 P.M. Adjournment

Wednesday, February 11

9:00 A.M. "Medical Aspects," continued
 Roundtable Discussion, continued
 Audience Questions and Comments
 Moderator's Summation

10:00 A.M. Summary of Paper: "Occupation and Disease-
 A Guide for Decision-Making"
 (Report of Contract 210-75-
 0075 to NIOSH)
 John F. Osterritter, M.D., Ph.D.
 Consultant in Occupational Health
 HALCYON - New York

Discussant: Marvin L. Amdur, M.D.
 Director,
 Buffalo Industrial Medical
 Center

10:30 A.M. Coffee Break

10:40 A.M. Roundtable Discussion
 Audience Questions and Comments
 Moderator's Summation

- 4 -

12:30 P.M. Lunch

1:45 P.M. Issue Area Three - Legal and Administrative Aspects of Handling Occupational Diseases (State and Federal)

Moderator: J. Howard Bunn, Jr., J.D.

Summary of Paper: "Legal Aspects of Handling Occupational Diseases"

John H. Lewis, J.D.
Former Chief Counsel,
National Commission on State
Workmen's Compensation Laws

Discussants: The Honorable Ben Novicoff
Presiding Judge, Workmen's
Compensation Court
State Capitol
Lincoln, Nebraska

Andrew Kalmykow, J.D.
Assistant General Counsel
American Insurance
Association

Roundtable Discussion

3:20 P.M. Coffee Break

3:40 P.M. Audience Questions and Comments

Moderator's Summation

4:00 P.M. Summary of Paper: "Administrative Aspects of Handling Occupational Diseases"

J. T. Noblin, J.D.
Chairman,
Workmen's Compensation Commission
Jackson, Mississippi
Pres., Internat'l Assoc. of
Industrial Accident Boards
and Commissions

- 5 -

Discussant: Clarence G. Johnson, J.D.
Senior Vice President and
General Counsel
Argonaut Insurance Company

Roundtable Discussion

Presentation and Discussion of
Proposed National Legislation

Audience Questions and Comments

Moderator's Summation

6:15 P.M.

Adjournment

Thursday, February 12 Legal and Administrative Aspects, continued

9:00 A.M.

Summary of Paper: "Black Lung--A Study in
Occupational Disease
Compensation" --

Nancy M. Snyder, M.A.
Associate Director for Coal
Mine Workers' Compensation,
Employment Standards
Administration
U. S. Department of Labor

Mark E. Solomons, L.L.M.
Assistant Counsel for
Black Lung Benefits
Office of the Solicitor
U. S. Department of Labor

Discussant: R. R. McMahan, LL.B.
Attorney at Law
Lord, Bissell and Brook--Chicago

9:30 A.M.

Roundtable Discussion

10:30 A.M.

Coffee Break

- 6 -

10:40 A.M.

Audience Questions and Comments

Moderator's Summation

11:00 A.M.

Issue Area Four - Program
Interrelationships and Costs

Moderator: John F. Burton, Jr., LL.B., Ph.D.
Associate Professor of
Industrial Relations and
Public Policy
University of Chicago
Former Chairman, National
Commission on State Workmen's
Compensation Laws

Summary of Paper: "Programs to Protect
Workers with Occupational
Disease" -

Joseph Halpern, Ph.D.
Associate Director
Center for Social Research
and Development
University of Denver

Ronald W. Conley, Ph.D.
Director of Research
Interdepartmental Workers'
Compensation Task Force

Discussant: Anthony Mazzocchi
Director, Citizenship-
Legislative Department,
Oil, Chemical and Atomic
Workers International Union,
AFL-CIO

Roundtable Discussion

12:15 P.M.

Lunch

Roundtable Discussion, continued

Audience Questions and Comments

- 7 -

Moderator's Summation

2:30 P.M.

Summary of Paper: "The Costs of Occupational Diseases"

Peter S. Barth, Ph.D.
 Head, Department of Economics
 University of Connecticut
 Former Executive Secretary,
 National Commission on State
 Workmen's Compensation Laws

Frederick C. Collignon, Ph.D.
 Acting Assistant Professor,
 Department of City and
 Regional Planning
 University of California-
 Berkeley

Discussant: M. Russell Guy, J.D.
 Assistant to Manager of
 Safety and Workers'
 Compensation
 Bethlehem Steel Corporation

Roundtable Discussion

Audience Questions and Comments

Moderator's Summation

4:30 P.M.

Coffee Break

4:40 P.M.

Summary of Conference - Monroe Berkowitz, Ph.D.
 Professor of Economics
 Rutgers University

5:00 P.M.

Adjournment

* General Panelists:

Monroe Berkowitz, Ph.D.

Richard F. Schubert, LL.B.
 Vice President
 Bethlehem Steel Corporation

Interdepartmental Workers' Compensation Task Force

Policy Group:

U. S. Department of Labor

U. S. Department of Health, Education, and Welfare

U. S. Department of Commerce

U. S. Department of Housing and Urban Development-
Federal Insurance Administration

Office of Management and Budget

Council of Economic Advisers

Task Force Director:

J. Howard Bunn, Jr.

Conference on Occupational Diseases
and Workers' Compensation

Planning Committee:

J. Howard Bunn, Jr. (Chairman)
Director, Interdepartmental
Workers' Compensation Task Force

Peter S. Barth, Ph.D.
Head, Department of Economics
University of Connecticut

John Finklea, M.D.
Director, National Institute for
Occupational Safety and Health

Robert S. Hockwald, M.D.
Medical Director
Pacific Bell Telephone Company

Henry Howe, M.D.
Associate Director
Department of Environmental, Public
and Occupational Health
American Medical Association

Harold R. Imbus, M.D.
Medical Director
Burlington Industries

Mr. Clarence G. Johnson
Senior Vice President and
General Counsel
Argonaut Insurance Company

Lorin E. Kerr, M.D.
Director, Department of Occupa-
tional Health
United Mine Workers of America

Marcus Key, M.D.
Professor of Occupational Medicine
University of Texas, Health
Science Center at Houston

Mr. John H. Lewis
Attorney at Law
Member of the Florida Bar

The Honorable Ben Novicoff
Presiding Judge, State of
Nebraska Workmen's Compensa-
tion Court

Mr. James O'Brien
Assistant Director, Department
of Social Security, AFL-CIO

Norbert J. Roberts, M.D.
Medical Director
Exxon Corporation

Irving J. Selikoff, M.D.
Director, Environmental
Science Laboratory
Mt. Sinai Hospital

Ms. Nancy Snyder
Associate Director for Coal Mine
Workers' Compensation
Employment Standards Administration
U. S. Department of Labor

Mr. Norman A. Weintraub
Director of Research
International Brotherhood of
Teamsters

Conference Coordinator:
Ms. June M. Robinson, IWCTF

Administrative Assistant:
Ms. India C. Wimberly, IWCTF

BIOGRAPHICAL SUMMARY - MARVIN L. AMDUR

- Education: Doctor of Medicine, 1936, University of Buffalo School of Medicine.
- Experience: Director, Buffalo Industrial Medical Center (currently).
Physician, Buffalo Hospital Sisters of Charity and Kenmore Mercy Hospital and (also Head of Occupational Medicine at the latter).
Clinical Instructor in Preventive Medicine, State University of Buffalo School of Medicine.
- Professional Activities: Fellow - American Academy of Occupational Medicine, American Industrial Medical Association, American College of Preventive Medicine, American Public Health Association.
Member - American College of Chest Physicians; American Medical Association of State of New York; Erie County Medical Society.
- Authorships: Research and other articles in professional journals, e.g., Industrial Medicine, Occupational Medicine, AMA Archives of Industrial Health, Journal of Occupational Medicine, and others.

BIOGRAPHICAL SUMMARY - NICHOLAS A. ASHFORD

NICHOLAS A. ASHFORD HOLDS BOTH A PH.D. IN CHEMISTRY AND A LAW DEGREE FROM THE UNIVERSITY OF CHICAGO AND IS A SENIOR STAFF MEMBER OF THE CENTER FOR POLICY ALTERNATIVES AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

HE HAS RECENTLY COMPLETED A MAJOR WORK FOR THE FORD FOUNDATIONS ENTITLED: CRISIS IN THE WORKPLACE: OCCUPATIONAL DISEASE AND INJURY PUBLISHED BY THE MIT PRESS. DR. ASHFORD SERVES AS A CONSULTANT IN OCCUPATIONAL HEALTH TO THE FORD FOUNDATION AND THE DEPARTMENT OF LABOR. HE IS CURRENTLY DEVELOPING A METHODOLOGY FOR DECISION-MAKING IN THE REGULATING OF CHEMICALS FOR THE U.S. COUNCIL ON ENVIRONMENTAL QUALITY AND FOR THE ENVIRONMENTAL PROTECTION AGENCY.

BIOGRAPHICAL SUMMARY - PETER S. BARTH

- Education: B.A., 1958, Columbia College.
Ph.D., 1965, University of Michigan.
- Experience: Professor and Head, Department of Economics, University of Connecticut (currently).
Director, Office of Research, Office of the Assistant Secretary for Policy, Evaluation, and Research, U. S. Department of Labor.
Executive Director, National Commission on State Workmen's Compensation Laws.
Brookings Institution Economic Policy Fellow
Assistant and Associate Professor of Economics, Ohio State University.
Lecturer and Advisor, several international Human Resources Planning programs through the U. S. Department of Labor and U. S. Agency for International Development.
- Authorships: Papers on the labor force welfare system, manpower policy, workmen's compensation for: the Ohio Economics Association, the Manpower Commission of the State of Ohio, the American Public Health Association, and others.
Co-author of the Compendium on Workmen's Compensation of the National Commission on Workmen's Compensation and Director "Editor" of the Commission's Supplemental Studies.
Several books and articles in publications including: The Monthly Labor Review, Bulletin of the Bureau of Business Research, the Labor Law Journal.

BIOGRAPHICAL SUMMARY - MONROE BERKOWITZ

- Education: B.A., 1942, Ohio University.
M.A., 1946, Columbia University.
Ph.D., 1951, Columbia University.
- Experience: Professor of Economics, Department of Economics, Rutgers College, Rutgers University (currently).
Director, Disability and Health Economics Research Section, Bureau of Economic Research, Rutgers University (currently).
Consultant: National Cancer Institute; New Jersey Division of Vocational Rehabilitation; U. S. Social Security Administration; World Health Organization.
Member: Board of Trustees, Joint Council on Economic Education, State of New Jersey; Board of Trustees, Kessler Institute for Rehabilitation; Panel of Arbitrators of American Arbitration Association, and others.
- Professional Organizations: American Economic Association, Industrial Relations Research Association; National Academy of Arbitrators; American Association of University Professors; National Rehabilitation Association.
- Authorships: Chapters in the National Commission on State Workmen's Compensation Laws, Compendium on Workmen's Compensation and the Commission's Supplemental Studies, and Editor of the latter; articles on workers' compensation, mediation, rehabilitation, labor and industrial relations in numerous publications, e.g., Industrial Gerontology, Journal of Human Resources, Industrial and Labor Relations, Industrial and Labor Relations Review.

BIOGRAPHICAL SUMMARY - J. HOWARD BUNN, JR.

Education: B.S., Wake Forest University
J.D., Wake Forest University School of Law

Experience: Director, Interdepartmental Workers'
Compensation Task Force, D/Labor,
(currently).
Chairman, North Carolina Industrial
Commission
Practised law in Charlotte, North Carolina.

Professional
Organizations: Southern Association of Workmen's
Compensation Administrators, Executive
Committee; International Association
of Industrial Accident Boards and
Commissions, Executive Committee;
North Carolina State Bar.

BIOGRAPHICAL SUMMARY - JOHN F. BURTON, JR.

- Education: B.S., Industrial and Labor Relations, 1957, Cornell University
LL.B., 1960, University of Michigan.
Ph.D., Economics, 1965, University of Michigan.
- Experience: Associate Professor of Industrial Relations and Public Policy, Graduate School of Business, University of Chicago (currently).
Chairman, National Commission on State Workmen's Compensation Laws.
Senior Staff Economist, Council of Economic Advisers.
Several lecturer and professional positions in various universities.
- Professional Activities: President, Workers' Disability Income Systems, Inc.
Unemployment and Workmen's Compensation Committee, Chamber of Commerce of the United States.
Workmen's Compensation Committee, Section of Insurance and Compensation Law, American Bar Association.
Numerous other professional memberships.
- Authorships: Several books and articles collaboratively and alone on workmen's compensation, industrial and labor relations, and labor mobility in Industrial Relations, Monthly Labor Review, The American Journal of Comparative Law, and others.
Collaborated in the Supplemental Studies and The Report of the National Commission on State Workmen's Compensation Laws.

BIOGRAPHICAL SUMMARY - FREDERICK C. COLLIGNON

- Education: B.A., 1965, Columbia University
 M.A., 1968, Political Economy and Government,
 Harvard University.
 Ph.D., Political Economy and Government,
 Harvard University.
- Experience: Assistant Professor, Department of City
 and Regional Planning, University of
 California, Berkeley.
 Legislative Assistant, the Hon. Clarence D.
 Long (Md.) U. S. House of Representa-
 tives.
 Program Analyst and Budget Examiner,
 Bureau of the Budget, Executive Office
 of the President.
 Senior Economist, ABT Associates, Inc.,
 Cambridge, Massachusetts.
 Consultant to numerous public and private
 organizations, including the Rehabilitation
 Services Administration, Department of
 Health, Education, and Welfare; TRW,
 the Interdepartmental Workers'
 Compensation Task Force.
- Authorships: Articles in several publications, e.g.,
Rural Sociology, ABT Associates reports,
The American Voter.

BIOGRAPHICAL SUMMARY - RONALD W. CONLEY

- Education: B.A., Economics, 1958, University of Washington.
Ph.D., Political Economy, 1964, The Johns Hopkins University.
- Experience: Director, Research Division, Interdepartmental Workers' Compensation Task Force (currently).
Director, Division of Monitoring and Program Analysis, Rehabilitation Services Administration (DHEW).
Economist, the National Institute of Mental Health and the President's Committee on Mental Retardation.
Lecturer in Economics, University of Maryland.
- Academic and Professional Memberships: Phi Beta Kappa; American Economic Association; National Rehabilitation Association.
- Authorships: The Economics of Vocational Rehabilitation;
The Economics of Mental Retardation;
Monographs and articles in several professional journals, e.g., The Journal of Human Resources, L'Information Psychiatrique,
The Southern Economic Journal.

BIOGRAPHICAL SUMMARY - MORTON CORNEducation:

Bachelor's degree, Chemical Engineering,
1955, Cooper Union.
Master's degree, Industrial Hygiene and
Sanitary Engineering, 1956, Harvard
University.
Ph.D. (same fields), 1961, Harvard
University.
Additional study in London on a John Simon
Guggenheim Fellowship.

Experience:

Assistant Secretary of Labor, Occupational
Safety and Health Administration, U. S.
Department of Labor (currently).
Professor, Department of Occupational
Health, Graduate School of Public Health,
and Adjunct Professor in the Department
Chemical Engineering, University of
Pittsburgh.
Research Aide and Engineer, U. S. Atomic
Energy Commission.
Research, lecturer and faculty positions,
Harvard School of Public Health and the
London School of Hygiene.
Consultant services to many governmental
agencies, private, nonprofit organizations,
legal and insurance firms and industrial
clients.

Professional
Organizations:

Membership in several health or safety-
related associations.

BIOGRAPHICAL SUMMARY - DR. ERNEST M. DIXON

Education: Doctor of Medicine, 1947, University of Virginia
Doctor of Science, 1957, University of Cincinnati

Specialty: Originally Internal Medicine and Cardiology
Board Certified in Occupational Medicine in 1960

Experience: 1947-1957 Specialty Training and Teaching, Military
Service, and Private Practice

Industrial
Experience: American Cyanamid - 7 years
Bell System (Western Electric and AT & T) - 3 years
Celanese - 10½ years

Professional
Societies: Member or Fellow of all major societies in field
plus Celanese Medical Representative to several
trade associations.

BIOGRAPHICAL SUMMARY - DAVID P. DISCHER

- Education: B.S., 1955, University of Notre Dame
M.D., 1959, University of Illinois
- Experience: Director, Center for Occupational Health
and Safety, Office of Research Operations,
Stanford Research Institute
Chief of Medical Services and of Radio-
biology Unit, Public Health Service
Various teaching positions, University
of California (Los Angeles), University
of Washington
Project directorships with U. S. Public
Health Service related to occupational
disease and morbidity, epidemiology,
and development of criteria documents
for chemical agent hazards
- Professional
Activities: Certified by the American Board of
Preventive Medicine; licensed in Illinois,
Ohio, California, and Washington; member-
ships in many public health, occupational
health, and respiratory disease organiza-
tions.
- Authorships: Numerous on epidemiology related to
radiation effects and respiratory health,
plus publications on occupational safety
and health programs and evaluations thereof.

BIOGRAPHICAL SUMMARY - PHILIP E. ENTERLINE

- Education: B.B.A., 1942, Westminster College
M.A., 1954, The American University
Ph.D., 1960, The American University
- Experience: Professor of Biostatistics, Graduate School of Public Health, University of Pittsburgh. Other teaching positions at The American University, McGill University and the University of Michigan.
Variety of positions with the U.S. Public Health Service relating to Biometrics and Health Statistics, focusing on Tuberculosis, Chronic Disease, Heart Disease, and Morbidity.
Consultant to numerous public and private, businesses and educational institutions
Advisory Committee Member of many Federal and independent groups.
- Professional Organizations: American Statistical Association, American Public Health Association, International Epidemiological Association.
- Authorships: Numerous research articles, collaboratively and alone on occupational and other diseases and related topics in professional journals and proceedings, e.g., Journal of Occupational Medicine; American Journal of Public Health, Monthly Labor Review, Archives of Environmental Health, Proceedings of the Second International Conference on Biological Effects of Asbestos, and many others.

BIOGRAPHICAL SUMMARY - JOHN F. FINKLEA

- Education: Bachelor's degree, Davidson College
M.D., 1958, University of South Carolina
M.P.H., 1964, University of Michigan
D.P.H. 1966, University of Michigan
- Experience: Director, National Institute for Occupational Safety and Health (currently).
Director, National Environmental Research Center, Environmental Protection Agency.
Chief, Ecological Research Branch, National Air Pollution Control Administration.
Associate Professor of Pediatrics and Preventive Medicine, Medical University of South Carolina.
- Professional Organizations: American Public Health Association;
American Academy of Pediatrics; American Medical Association, American College of Preventive Medicine, and several other professional societies.

BIOGRAPHICAL SUMMARY - M. RUSSELL GUY

Education: B.S., 1957, University of Baltimore
J.D., 1961, University of Baltimore

Experience: Assistant to Manager, Safety and Workmen's
Compensation Division, Industrial
Relations Department, Bethlehem
Steel Corporation (currently).
Accepted to Practice - Supreme Court
of the United States.

Professional
Activities: Board of Managers, National Council
of Self-Insurers; Vice-President,
Pennsylvania Self-Insurers' Associa-
tion; Workmen's Compensation
Committee - West Virginia Coal
Association; Workmen's Compensation;
Committee - Kentucky Coal Association;
National Association of Manufacturers;
Governor's Review of Government
Management - Commonwealth of Pennsylvania.

BIOGRAPHICAL SUMMARY - JOSEPH HALPERN

- Education: B.A., Psychology, 1963, City College of New York.
M.S., Psychology, 1965, University of Massachusetts.
Ph.D., Psychology, 1966, University of Massachusetts.
- Experience: Associate Director, Center for Social Research and Development, Denver Research Institute.
Adjunct Professor of Psychology and similar positions, University of Denver.

Research Consultant to numerous agencies, including the Interdepartmental Workers' Compensation Task Force.
- Professional Organizations: American Psychological Association, American Association of University Professors; American Association for the Advancement of Science; New York Academy of Sciences; other major related groups.
- Authorships: Research articles in numerous publications, e.g., Psychonomic Science, Behavioral Science, Journal of Experimental Psychology, Perception and Psychophysics.

BIOGRAPHICAL SUMMARY - CLARENCE G. JOHNSON

Education: Undergraduate and law degrees received in Nebraska.

Experience: Senior Vice President and General Counsel, Argonaut Insurance Company (currently). Accepted to Practice in California, Utah, Nebraska, and Iowa.

Professional Activities: Past Chairman, Workers' Compensation Committee, American Bar Association; Member of Council, American Bar Association, Insurance Negligence Compensation Law Section. Member, Governor's Task Force on Workers' Compensation. " Member, California State Workers' Advisory Committee.

BIOGRAPHICAL SUMMARY - ANDREW KALMYKOW

Education: Bachelor's degree, Columbia University
College
Law degree, Columbia University Law School .

Experience: Assistant General Counsel, American
Insurance Company (currently)
Consultant, International Association
of Industrial Accident Boards and
Commissions.
Consultant to numerous study commissions,
legislative and other interest groups.

Professional
Organizations: New York Bar; National Commission on
State Workmen's Compensation Laws;
Board of Trustees--Industrial Health
Foundation of America; Unemployment
and Workmen's Compensation Committee -
U. S. Chamber of Commerce; Committee
on Workmen's Compensation and Employers'
Liability Law; American Bar Association;
Advisory Committee on Workmen's
Compensation Laws of the Council of
State Governments.

BIOGRAPHICAL SUMMARY - DONALD V. LASSITER

Date of Birth: April 10, 1941

High School Education: Gary, Indiana

College Education: University of Oklahoma
B.S. - Microbiology
M.S. - Environmental Health
Ph.D.- Environmental Health

Military Service: 2 years active duty with U.S. Army
(Company Commander in Vietnam)

Professional Experience:

Environmental Health Scientist in Office of Research and Standards Development, National Institute for Occupational Safety and Health (NIOSH), responsible for analysis of research "gaps" or requirements and coordination of Institute's program to develop recommended protection and control procedures for occupational carcinogens.

Presently detailed to the Occupational Safety and Health Administration (OSHA) to provide assistance in occupational health and liaison between NIOSH and OSHA.

BIOGRAPHICAL SUMMARY - JOHN LEWISEducation:

University of Florida, BS/BA 1963

Duke University School of Law, JD 1967

Professional:Private Practice 1967 to Present

Associate Author of Larson's Law of Workmen's Compensation
(dealing with every state on legal matters)

Chief Counsel & Associate Executive Director, National Commission of
State W.C. Laws

Instructor of Law in W C University of Miami School of Law

Vice-Chairman of Governor's Task Force on W C (Florida

Chairman, Florida W.C. Advisory Council

BIOGRAPHICAL SUMMARY - THOMAS F. MANCUSO

- Education: Columbia University
B.S. in Medicine, Creighton University
M.D., 1937, Creighton University
M.P.H., 1953, University of Pittsburgh
- Experience: Research Professor of Occupational Health,
Graduate School of Public Health,
University of Pittsburgh (currently).
Chief, Division of Industrial Hygiene,
Ohio Department of Health
Director, Division of Industrial Hygiene,
(U.S.P.H.S.), Oregon State Board of
Health
Industrial Hygiene Physician (U.S.P.H.S.),
Michigan State Department of Health.
- Professional
Activities: Offices held in many associations, e.g.,
American Public Health Association;
American Board of Preventive Medicine;
Industrial Medical Association; National
Academy of Sciences.
- Authorships: Extensive number of publications in the
scientific literature.

BIOGRAPHICAL SUMMARY - ANTHONY MAZZOCCHI

- Born: June 13, 1926 - Brooklyn, New York
- Military Service: Three years, United States Army.
Served in four campaigns WWII,
European Theater of Operation
- Labor Movement: Has been an official with the labor movement since 1950.
Served thirteen years as President of New York Local
No. 8-149, OCAW; nine years as International Executive
Board Member, OCAW; and presently serving as
Citizenship-Legislative Director of the Oil, Chemical
and Atomic Workers International Union, AFL-CIO, in
Washington, D. C.
- Community Affairs: Served three years on the Nassau County Commission on
Vocational and Special Education, a committee created
by the New York State Legislature; six years as Com-
missioner of the Nassau County Planning Commission,
New York; and presently serving as Board Member of the
Scientists' Institute for Public Information (SIPI).

BIOGRAPHICAL SUMMARY - R. R. McMAHAN

Education: B.A., 1962, Wesleyan University.
LL.B., 1965, Yale University.

Experience: Admitted to bar, 1964, Illinois
Admitted to Practice, U. S. Supreme
Court, 1970.

Professional
Organizations: Chicago Bar Association.
Chicago Council of Lawyers
Board of Editors, Yale Law Journal,
1963-1965.

BIOGRAPHICAL SUMMARY - J. T. NOBLIN

Education: Bachelor's degree, Millsaps College
Law degree, University of Mississippi
School of Law.

Experience: Chairman, Mississippi Workmen's Compensation Commission (currently).
President, International Association
of Industrial Accident Boards and
Commissions (currently).
Private practice (previously).

Professional
Activities: American Bar Association; Hinds County,
Mississippi Bar Association; American
Judicature Society.

BIOGRAPHICAL SUMMARY - THE HONORABLE BEN NOVICOFF

Education: B.S., 1942, University of Nebraska.
LLB., J.D., 1948, University of Nebraska.

Experience: Presiding Judge, Workmen's Compensation
Court of the State of Nebraska
(currently).
Private general practice (previously).

Professional
Organizations: Nebraska State Law Association; American
Bar Association; American Judiciary
Society; International Association of
Industrial Accident Boards and Commissions;
Advisory Committee on Workmen's Compens-
ation Laws of the Council of State
Governments.

BIOGRAPHICAL SUMMARY - DR. JOHN F. OSTERRITTER

Education: B.S., 1945, University of Pittsburgh.
M.D., 1950, University of Pittsburgh.
M.P.H., 1952, University of Pittsburgh.
Ph.D., 1955, University of Pittsburgh.

Experience: Health Service Consultant and President
of HALCYON.
Corporate Medical Director, Celanese
Corporation of America.
Assistant Medical Director, Pittsburgh
Coke and Chemical Company.
Staff Physician, Psychological Service
of Pittsburgh.
Other Specialty Positions.

Professional
Organizations: American Medical Association, New York
State Medical Association, Industrial
Medical Association, and other major
societies in the field.

BIOGRAPHICAL SUMMARY - NORBERT J. ROBERTS

Medical Director
Eaton Corporation .

Dr. Roberts received his medical training at the University of Buffalo, and his postgraduate training in internal medicine at The Mayo Foundation, Rochester, Minn.

He joined Exxon Corporation in 1949 and has been employed in its medical service since that time except for a period of three years from 1952-55 when he served as Medical Director of the Pennsylvania Railroad.

He is a lecturer at the Institute of Environmental Medicine of New York University, and Associate Clinical Professor in the Department of Community Medicine of Mount Sinai School of Medicine. A diplomate of the American Board of Internal Medicine and of the American Board of Preventive Medicine, Dr. Roberts is a Past President of the American Occupational Medical Association.

BIOGRAPHICAL SUMMARY - SHELDON SAMUELS

Founding member of Society for Occupational and Environmental Health; served on faculty of Mt. Sinai School of Medicine; represents labor movement on National Advisory Committee of Blue Cross Asso., U. S. Commerce Technical Advisory Board; Consultant to National Institute for Environmental Health Services; National Cancer Institute, Adviser to Ohio OSHA Program, National Academy of Science, National Health Council, and other academic and governmental institutes. Has been on staff at IUD since April 1971.

Author of commentaries and studies relative to Social Change and the Environment.

BIOGRAPHICAL SUMMARY - RICHARD F. SCHUBERT

- Education: B.A., 1958, Eastern Nazarene College.
LL.B., 1961, Yale Law School.
- Experience: Assistant Vice President, Public Affairs,
Bethlehem Steel Corporation (currently).
Under Secretary of Labor, U. S. Department
of Labor.
Solicitor, U. S. Department of Labor.
Vice President, Industrial Relations
Department, Bethlehem Steel Corporation.
Admitted to Practice--Pennsylvania and
Supreme Court of the United States.
- Professional
Activities: Editorial Board Member, Industrial
Relations Research Association (1977).
- Other: Received honorary Doctor of Laws degree
from Eastern Nazarene College and is
a Trustee of the College.

BIOGRAPHICAL SUMMARY - IRVING J. SELIKOFF

- Professor of Medicine and Professor of Community Medicine
Mount Sinai School of Medicine, City University of New York
- Director, Environmental Sciences Laboratory, Mount Sinai
School of Medicine, 1967-
- President, The New York Academy of Sciences, 1969
- Governor, The New York Academy of Sciences, 1970-
- Editor-in-Chief, "Environmental Research" (Academic Press),
1967-
- Lasker Award, American Public Health Association, 1955
- Poiley Award and Medal for Biological Research, New York
Academy of Sciences, 1974
- Haven Emerson Award, Public Health Association, N.Y. 1975
- President, The Society for Occupational and Environmental
Health, 1973-1974
- Diplomate, American Board of Preventive Medicine
- Program Director, Environmental Health Sciences Research Center
(NIEHS), Mount Sinai School of Medicine, 1973-

BIOGRAPHICAL SUMMARY - NANCY M. SNYDEREDUCATION

B.S., Ohio State University; M.A., Columbia University.
Further study toward Doctorate, New York University.

EXPERIENCE

Ms. Snyder was appointed Associate Director for Coal Mine Workers' Compensation, Office of Workers' Compensation Programs, Employment Standards Administration, on July 1, 1973. Before that she had served in the Office of the Under Secretary of Labor as Acting Deputy Director of the Special Projects Staff involved in the development of plans, policies and systems for the Department's administration of the 1969 Federal Coal Mine Health and Safety Act, as amended. This same staff had been responsible for providing operational planning within the Department for the proposed Welfare Reform legislation.

Ms. Snyder began her Federal Government career in 1962 with the Peace Corps. As Chief of the Screening Branch, she directed a staff that made the first professional determinations as to the suitability of persons volunteering for manpower slots overseas. In 1965, she joined the Office of Economic Opportunity, where she was responsible for planning and directing the national adult participation programs for Head Start. She moved to the Department of Labor in 1966 and among other positions served as Chief, Division of Work Experience Programs, U.S. Training and Employment Service, Manpower Administration in 1970 and 1971, where she was responsible for directing the national programs of the Neighborhood Youth Corps and Operation Mainstream (a program for older rural workers).

BIOGRAPHICAL SUMMARY - MARK E. SOLOMONS

University of Rochester, B.A. 1967
University of Pennsylvania, J.D. 1970
George Washington University, L.L.M. 1973

Guest lecturer in History and Law

Hobart College, 1971-1974
University of Michigan, 1972
State University of New York
at Stony Brook, 1972-1974

Employed in the Office of the Solicitor, U.S. Department
of Labor, 1970 - present.

1972-1973, Legal Advisor to the Under Secretary's Special
Projects Staff. Drafted program regulations for
Department of Labor's Black Lung Benefits Program and
provided legal assistance and advice to Executive Staff in
the planning and implementation of that program.

1973-present, Supervisory responsibility for all litigation
arising out of claims for benefits and other litigation
arising in connection with the Department's Black Lung
Benefits Program. Legal advisor to program Director.

THE MAGNITUDE OF THE OCCUPATIONAL HEALTH PROBLEM*†

NICHOLAS A. ASHFORD, PH.D., J.D.
 CENTER FOR POLICY ALTERNATIVES
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 CAMBRIDGE, MASSACHUSETTS

THE MUCH NEEDED REFORM OF THE WORKERS' COMPENSATION SYSTEM CANNOT PROCEED FAR WITHOUT A SENSIBLE APPRECIATION OF THE MAGNITUDE OF THE OCCUPATIONAL DISEASE PROBLEM. UNLIKE INDUSTRIAL INJURY, A SUBSTANTIAL PROPORTION OF OCCUPATIONAL DISEASE MAY HAVE MULTIPLE ETIOLOGY, MAY BE COMPLICATED BY NON-OCCUPATIONAL FACTORS, AND MAY BE DIFFICULT TO DIAGNOSE. IN ADDITION, OCCUPATIONAL DISEASE MAY BE CHARACTERIZED BY LONG LATENCY PERIODS WHICH FURTHER COMPLICATES ATTEMPTS TO COMPREHEND FULLY THE EXTENT AND NATURE OF THE PROBLEM.

I HAVE BEEN ASKED TO COMMENT ON THE MAGNITUDE AND NATURE OF OCCUPATIONAL DISEASE AS INDICATED BY THE BEST AVAILABLE EVIDENCE. THIS TASK WOULD IN REALITY REQUIRE AN OPEN-ENDED RESEARCH EFFORT — AND DEAL WITH A MOVING TARGET. FURTHERMORE, THE INTERRELATIONSHIP BETWEEN OCCUPATIONAL

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†SOME OF THE MATERIAL IN THIS PAPER HAS BEEN EXCERPTED FROM CRISIS IN THE WORKPLACE: OCCUPATIONAL DISEASE & INJURY. A REPORT TO THE FORD FOUNDATION BY NICHOLAS A. ASHFORD, MIT PRESS, SPRING 1976.

-2-

AND ENVIRONMENTAL DISEASE DEMANDS AN EXAMINATION OF THE EPIDEMIOLOGICAL EVIDENCE FROM BOTH THE WORK ENVIRONMENT AND FROM COHORTS DRAWN FROM DIFFERENT GEOGRAPHICAL REGIONS AND SOCIO-ECONOMIC GROUPS. THE TASK IS AN ENORMOUS ONE; YET WE ALREADY HAVE INDICATIONS OF THE POSSIBLE SERIOUSNESS OF THE OCCUPATIONAL DISEASE PROBLEM. WHAT I HOPE TO PRESENT IS A SENSIBLE FRAMEWORK FOR DISCUSSION OF THE PROBLEM AND NOT A DEFINITIVE TREATISE ON OCCUPATIONAL DISEASE. WHAT IS IMPORTANT TO GRASP IS THAT DIFFERENT AND SEEMINGLY UNRELATED DATA APPEAR TO POINT TO THE FACT THAT AN ALARMING AMOUNT OF THE DISEASE FROM WHICH WE SUFFER TODAY IS OF OCCUPATIONAL ORIGIN.

A MAIN UNDERLYING QUESTION OF OUR DISCUSSIONS AT THIS CONFERENCE SHOULD BE TO WHAT EXTENT WE NEED TO KNOW THE MAGNITUDE AND NATURE OF THE PROBLEM IN ORDER TO SUGGEST WORKABLE AND RESPONSIVE REFORMS IN THE WORKERS' COMPENSATION SYSTEM. FOR THE PURPOSES OF WORKERS' COMPENSATION, THE STANDARD OF PROOF REQUIRED TO RECOGNIZE A PATHOLOGY AS OCCUPATIONAL IN ORIGIN NEED NOT BE THE SAME AS THAT REQUIRED FOR SETTING AN OCCUPATIONAL HEALTH STANDARD. I WOULD SUBMIT THAT THE RESISTANCE TO INCLUDE OCCUPATIONAL DISEASE IN THE WORKERS' COMPENSATION SYSTEM LIES NOT SO MUCH IN THE ANTICIPATION OF HIGHER PREMIUMS PER SE, BUT MORE IN THE LARGE UNCERTAINTY WHICH WE ATTACH TO THE MAGNITUDE OF THE DISEASE PROBLEM AND SUBSEQUENT PAYMENTS. FURTHERMORE, TO THE EXTENT THAT OUR PRESENT OCCUPATIONAL DISEASE PROBLEMS ARE CHRONIC IN NATURE, WE MAY BE FACED WITH AN IMMENSE BACKLOAD OF PAYMENTS FOR PAST SINS. ONE THING IS CLEAR: WHETHER OR NOT A LARGE PROPORTION OF DISEASE IS OCCUPATIONAL IN ORIGIN, ^{MUCH} ENVIRONMENTAL DISEASE DOES HAVE ITS ORIGIN IN THE INDUSTRIAL PROCESS. THOSE WHO ARE DISTURBED

-3-

AT THE NOTION THAT WE MAY RECOMMEND AN "OVERPAYMENT" FOR DISEASE WHICH IS ACCEPTED AS OCCUPATIONAL ON LESS-THAN-CERTAIN EVIDENCE, MAY FIND COMFORT IN THE REALIZATION THAT WE ARE UNDERCOMPENSATING FOR ENVIRONMENTAL DISEASE -- ~~FROM~~ OF INDUSTRIAL ORIGIN.

IN ITS BROADEST SENSE, THEN, I WOULD SUGGEST THAT THE DEFINITION OF OCCUPATIONAL DISEASE INCLUDE DISEASE WHICH IS CAUSED SOLELY OR PARTIALLY BY OCCUPATIONAL FACTORS AND WHICH RESULTS IN A REDUCTION IN A WORKER'S PHYSICAL AND MENTAL WELL-BEING, EVEN IF THAT DISEASE DOES NOT BECOME MANIFEST UNTIL AFTER HE/SHE HAS LEFT THE WORK FORCE.

HOW LARGE ARE THE PROBLEMS OF OCCUPATIONAL AND ENVIRONMENTAL DISEASE? LET US EXAMINE THE NUMBERS -- BUT WITH DISRAELI'S REMINDER THAT THERE ARE THREE KINDS OF LIES: "LIES, DAMNED LIES AND STATISTICS". MOST EPIDEMIOLOGICAL EVIDENCE FOR THE IDENTIFICATION OF CAUSAL AGENTS COMES FROM THE OCCUPATIONAL SETTING, WHERE WORKERS ARE EXPOSED TO HIGH CONCENTRATIONS OF POTENTIAL HAZARDS FOR LONG PERIODS OF TIME. OTHER EPIDEMIOLOGICAL EVIDENCE, SUCH AS CANCER INCIDENCE BY GEOGRAPHICAL REGION, ALSO PROVIDES INSIGHT -- ESPECIALLY AS TO THE MULTIPLE ETIOLOGY OF DISEASE.

PRIOR TO ENACTMENT OF THE OSHA²ACT, THERE WAS NO SYSTEMATIC ATTEMPT TO COLLECT DATA ON THE INCIDENCE OF OCCUPATIONAL ILLNESS AND DISEASE -- AS OPPOSED TO INJURY -- IN THE UNITED STATES.* ONE RESULT OF THE OSHA²ACT

*In 1965, 27,000 OCCUPATIONAL DISEASES WERE REPORTED IN CALIFORNIA, A STATE WHERE SUCH DISEASE IS REPORTABLE AND WHERE THERE ARE VIGOROUS HEALTH AND SAFETY PROGRAMS. IF THIS RATE HOLDS NATIONALLY, THEN THERE ARE EVERY YEAR AT LEAST 335,000 CASES OF OCCUPATIONAL DISEASE AMONG THE 75 MILLION EMPLOYED CIVILIANS IN THE UNITED STATES. (1)

-4-

HAS BEEN THE INITIATION OF NEW RECORD-KEEPING AND REPORTING PRACTICES WHICH REQUIRE FIRMS TO RECORD EACH OCCURRENCE OF OCCUPATIONAL DISEASE AMONG THEIR EMPLOYEES. YET THE RESULTS OF THE DATA COLLECTION UNDER THE NEW STATISTICAL REPORTING SYSTEM INDICATES SERIOUS DEFICIENCIES IN THE IMPLEMENTATION OF ACCURATE REPORTING PRACTICES WITH REGARD TO THE INCIDENCE OF OCCUPATIONAL DISEASE. ACCORDING TO BLS STATISTICS, OCCUPATIONAL ILLNESS ACCOUNTED FOR UNDER 5% OF THE TOTAL INCIDENCE OF OCCUPATIONAL INJURY AND ILLNESS DURING THE PERIOD BETWEEN JULY 1, 1971 AND DECEMBER 31, 1972.* THESE ESTIMATES REVEAL THAT ROUGHLY 133,000 CASES OF OCCUPATIONAL ILLNESS, A LARGE PROPORTION OF WHICH WERE OF THE RELATIVELY NON-SERIOUS VARIETY (DERMATITIS, FOR EXAMPLE, ACCOUNTED FOR 33.9% OF ALL RECORDED OCCUPATIONAL ILLNESS), AND ONLY 600 DEATHS FROM OCCUPATIONAL DISEASE WERE RECORDED DURING THE LAST SIX MONTHS OF 1971.² YET OTHER ESTIMATES INDICATE THAT THE TRUE INCIDENCE OF THE MORE SERIOUS TYPES OF OCCUPATIONAL DISEASE IS SUBSTANTIALLY GREATER.

THE PUBLIC HEALTH SERVICE ESTIMATES 390,000 NEW CASES OF OCCUPATIONAL DISEASE ANNUALLY. EPIDEMIOLOGICAL ANALYSES OF EXCESS MORTALITY AMONG WORKERS IN SEVERAL INDUSTRIES SUGGEST THAT AS MANY AS 100,000 DEATHS OCCUR EACH YEAR AS A RESULT OF OCCUPATIONAL DISEASE.³ THUS, WE ARE FACED WITH ESTIMATES FOR DEATH FROM OCCUPATIONAL DISEASE WHICH RANGE FROM ABOUT 1,000 TO 100,000 ANNUALLY. THERE IS INDIRECT EVIDENCE THAT 1,000 DEATHS ANNUALLY IS A SERIOUS UNDERESTIMATE.

EVIDENCE FROM THE INSURANCE INDUSTRY INDICATES THAT THE EXCESS RISK OF DEATH, IN ACTUARIAL TERMS, IS SUBSTANTIAL AMONG CERTAIN OCCUPATIONAL

* This 1973 survey reported even less occupational illness.

-5-

GROUPS. THIS EXCESS RISK IS ON THE ORDER OF MAGNITUDE OF ALL THE OTHER RISKS OF DEATH WHICH WE FACE --- IN OTHER WORDS, THE PROBABILITY OF DEATH (GIVEN AGE, RACE, SEX, ETC.) FACING MEMBERS OF CERTAIN HAZARDOUS OCCUPATIONS IS IN SOME CASES GREATER THAN TWICE THE NORM FOR A MATCHED COHORT DRAWN FROM THE GENERAL POPULATION.⁴

OCCUPATIONAL AND ENVIRONMENTAL FACTORS MAY VERY WELL PLAY A FAR MORE SIGNIFICANT ROLE THAN IS PRESENTLY REALIZED IN THE CAUSATION OF THE MAJOR DISEASES AND HEALTH PROBLEMS WHICH FACE US. TWO MILLION PEOPLE DIE EVERY YEAR IN THE U.S. HEART DISEASE, THE LEADING CAUSE OF DEATH IN THE UNITED STATES. (38.7% OR ABOUT 750,000)⁵ IS ONLY 25% "EXPLAINED" BY KNOWN PHYSIOLOGICAL AND ENVIRONMENTAL FACTORS, SUCH AS OVERWEIGHT, HYPERTENSION, SERUM CHOLESTEROL AND CIGARETTE SMOKING.⁶ AN UNKNOWN, BUT QUITE POSSIBLY SUBSTANTIAL, PROPORTION OF THE 75% OF HEART DISEASE RISK WHICH IS PRESENTLY UNACCOUNTED FOR COULD BE RELATED TO STRESS, PRESENT IN BOTH THE WORK AND GENERAL (PARTICULARLY URBAN) ENVIRONMENT. TO WHAT EXTENT THE STRESS IS INCURRED BY EXPOSURE TO TOXIC MATERIALS AND POLLUTION, OR STRESS FROM THE PSYCHOSOCIAL ASPECTS OF THE WORK ENVIRONMENT, IS VERY DIFFICULT TO DETERMINE. IN THIS REGARD IT IS INTERESTING THAT A RECENT STUDY OF JAPANESE-AMERICANS HAS EXPLODED ONE OF THE MYTHS ABOUT THE LOWER RATE OF HEART DISEASE AMONG THE JAPANESE. IT WAS PREVIOUSLY POSTULATED THAT THEIR DIET WAS IMPORTANT. THE STUDY COMPARED A NUMBER OF SUBGROUPS AMONG JAPANESE-AMERICANS ALL OF WHOM HAVE THE SAME DIET, NOT VERY DIFFERENT FROM THE BASIC JAPANESE DIET. THOSE JAPANESE-AMERICANS WHO HAVE ACCLIMATIZED THEMSELVES TO THE AMERICAN LIFESTYLE EXHIBIT A HIGH RATE OF HEART DISEASE; THOSE WHO HAVE RETAINED

-6-

TRADITIONAL JAPANESE VALUES DO NOT AND INSTEAD RESEMBLE THE JAPANESE IN JAPAN. I THINK THESE KINDS OF STUDIES INDICATE THAT HEART DISEASE IN FACT MAY HAVE A VERY LARGE STRESS COMPONENT -- PERHAPS WORK-RELATED STRESS.

CANCER IS THE SECOND LEADING CAUSE OF DEATH IN THE U.S. TODAY WITH AN ANNUAL TOLL OF 365,000. THE INCIDENCE OF CANCER HAS RISEN RAPIDLY WITH INDUSTRIALIZATION: IN 1900, 3.7% OF DEATHS WERE DUE TO CANCER, BUT BY 1958 THE PROPORTION OF DEATHS FROM THIS CAUSE WAS 16.5%.⁷ IN PART, IMPROVED DIAGNOSIS AND LONGER LIFE EXPECTANCY DUE TO DECREASING PREVALENCE OF PREVIOUS HEALTH "SCOURGES" ARE RESPONSIBLE FOR THIS DRAMATIC INCREASE. NEVERTHELESS, THERE ARE INDICATIONS THAT THE TRUE INCIDENCE OF CANCER HAS IN FACT BEEN ON THE UPSWING.

RESEARCH IN THE UNITED KINGDOM INDICATES THAT OVER 80% OF CANCER IS OF ENVIRONMENTAL ORIGIN* AND THEREFORE, THEORETICALLY, IS PREVENTABLE.⁸ THIS CONCLUSION IS BASED UPON THE OBSERVATION THAT THE VARIATION AMONG GEOGRAPHIC AND OCCUPATIONAL ENVIRONMENTS IN CANCER INCIDENCE RATES IS ENORMOUS. THE HEW TASK FORCE ON RESEARCH PLANNING IN ENVIRONMENTAL HEALTH SCIENCE REPORTED THAT:

THERE IS ABUNDANT EVIDENCE THAT THE GREAT MAJORITY OF MALIGNANT NEOPLASMS -- PROBABLY OVER 90 PERCENT OF THE TOTAL -- ARE INDUCED, MAINTAINED OR PROMOTED BY SPECIFIC ENVIRONMENTAL FACTORS. MANY OF THE KNOWN ENVIRONMENTAL CAUSES OF CANCER ARE PHYSICAL AND CHEMICAL AGENTS THAT DIRECTLY CONCERN THE ENVIRONMENTAL HEALTH PROFESSIONS. CARCINOGENESIS MUST THEREFORE BE REGARDED AS ONE OF THE MOST SIGNIFICANT POTENTIAL CONSEQUENCES OF ENVIRONMENTAL CONTAMINATION. (9)

*including smoking and alcohol consumption

-7-

OF THE 80 OR 90 PERCENT OF CANCER WHICH COULD BE ENVIRONMENTALLY CAUSED, IT IS NOT PRESENTLY KNOWN HOW MUCH IS OCCUPATIONALLY RELATED. THERE SEEMS TO BE A GENERAL CONSENSUS AMONG CANCER RESEARCHERS AND ENVIRONMENTALISTS THAT ONE-QUARTER TO ONE-HALF OF THIS FIGURE IS COMPLICATED BY OCCUPATIONAL FACTORS. THE EXPERIENCE OF CHEMISTS, ASBESTOS WORKERS, UNDERGROUND URANIUM MINERS, AND MOST RECENTLY, RUBBER WORKERS HANDLING VINYL CHLORIDE -- AS WELL AS OTHER OCCUPATIONAL GROUPS -- AMPLY DOCUMENTS THE CASE THAT "EXCESS" CANCER OF VARIOUS TYPES IS INDEED OCCUPATIONALLY RELATED.

IN AN EXAMINATION OF THE CAUSE OF DEATH AMONG 2,151 CHEMISTS AGED 20 TO 64, IT WAS FOUND THAT THERE WERE 444 DEATHS FROM CANCER, WHEREAS 354 WERE EXPECTED -- A FINDING WHICH WAS HIGHLY STATISTICALLY SIGNIFICANT. IT CAN BE SPECULATED THAT THIS EXCESS MORTALITY DUE TO CANCER WAS LINKED TO THE CARCINOGENIC NATURE OF CERTAIN CHEMICAL AGENTS TO WHICH THESE CHEMISTS WERE EXPOSED DURING THE COURSE OF THEIR OCCUPATION.¹⁰

IN 1968 I WAS TOLD BY A STATISTICIAN FOR THE NATIONAL AIR POLLUTION CONTROL ADMINISTRATION THAT HE HAD OBSERVED THAT CHEMISTS AS A GROUP DIE FIVE YEARS SOONER THAN PHYSICISTS OR MATHEMATICIANS WHOSE MORTALITY AND MORBIDITY CHARACTERISTICS WERE ESSENTIALLY IDENTICAL. THESE FINDINGS WOULD SEEM TO INDICT CHEMICALS IN GENERAL AS A CAUSE OF DEATH, AND WOULD SEEM TO MAKE THE SUGGESTION THAT ONLY A FEW CHEMICALS ARE DOING THE HARM, IMPROBABLE.

THE RECENT WORK ON CANCER VARIATIONS BY GEOGRAPHICAL REGION IN THE UNITED STATES RELEASED THIS YEAR¹¹ PROVIDES EVEN MORE SUBSTANTIATION THAT

A SUBSTANTIAL PORTION

~~THE DATA~~ OF CANCER IN OUR SOCIETY RESULTS FROM THE INDUSTRIAL PROCESS.

THE HIGH CANCER INCIDENCE RATES (AMONG WHITE MALES BY THE WAY) ARE FOUND IN WHAT IS NOW BECOMING KNOWN AS THE "CANCER-BELT" — FROM WASHINGTON, D.C. TO BOSTON; IN GARY AND CHICAGO; AT THE MOUTH OF THE MISSISSIPPI, NEW ORLEANS WHERE THE DUMPED CHEMICALS ACCUMULATE; AND IN OAKLAND, CALIFORNIA. CANCER IN DIFFERENT HIGH INCIDENCE COUNTIES VARIES AS TO ITS TYPE, PROVIDING FURTHER EVIDENCE OF THE CHEMICAL AND INDUSTRIAL ORIGIN OF THE PROBLEM.

OF PARTICULAR SIGNIFICANCE IS RECENT WORK FROM THE NATIONAL CANCER INSTITUTE IN AN APPROPRIATELY-TITLED PAPER, "CANCER MORTALITY IN U.S. COUNTIES WITH CHEMICAL INDUSTRIES". THE ABSTRACT IS WORTH QUOTING HERE:

GEOGRAPHIC ANALYSIS OF U.S. CANCER MORTALITY, 1950-1969 REVEALED EXCESS RATES FOR BLADDER, LUNG, LIVER, AND CERTAIN OTHER CANCERS AMONG MALES IN 153 COUNTIES WHERE THE CHEMICAL INDUSTRY IS MOST HIGHLY CONCENTRATED. THE CORRELATION COULD NOT BE EXPLAINED BY CONFOUNDING VARIABLES SUCH AS URBANIZATION, SOCIOECONOMIC CLASS, OR EMPLOYMENT IN NON-CHEMICAL INDUSTRIES. IF THE EXCESS CANCER MORTALITY IN THESE AREAS IS DUE TO INDUSTRIAL EXPOSURES, THE ACTUAL RISK OF CANCER AMONG CERTAIN CHEMICAL WORKERS MUST BE VERY HIGH. THE CORRELATION WAS LIMITED TO COUNTIES ASSOCIATED WITH SPECIFIC CATEGORIES OF THE CHEMICAL INDUSTRY; MANY INVOLVE KNOWN OCCUPATIONAL HAZARDS, WHILE OTHERS SUGGEST NEW LEADS TO CHEMICALLY INDUCED CANCER IN MAN. (17)

SOME COMMON OCCUPATIONAL CARCINOGENS ARE LISTED IN TABLE I.

SINCE THE PRODUCTION OF PETROCHEMICALS IN THE U.S. HAS DOUBLED EVERY FIVE YEARS SINCE THE END OF WORLD WAR II, THE INCIDENCE OF CANCER CHARACTERIZED BY LONG LATENCY PERIODS MAY BE EXPECTED TO RISE SIGNIFICANTLY OVER THE NEXT 20 TO 30 YEARS. THIS EXPECTATION COINCIDES WITH CONSIDERABLE

-9-

LEGISLATIVE ACTIVITY GEARED TOWARDS CHEMICAL REGULATION -- ESPECIALLY OF
CHEMICAL CARCINOGENS.

CHRONIC DISEASES OF THE RESPIRATORY SYSTEM HAVE BEEN REPORTED WITH
INCREASING FREQUENCY IN THE U.S. AND HAVE BECOME MAJOR CAUSES OF DEATH AND
DISABILITY.¹⁴ CHRONIC BRONCHITIS AND EMPHYSEMA ARE THE FASTEST GROWING
DISEASES IN THE U.S. THEY ACCOUNT FOR THE SECOND HIGHEST NUMBER OF DIS-
ABILITIES UNDER SOCIAL SECURITY AND HAVE ^{INCREASED MARKEDLY} ~~DOUBLED~~ EVERY FIVE YEARS SINCE
WORLD WAR II.¹⁵ ^{DISAGREEMENT ABOUT THE RATE OF INCREASE} ~~ALTHOUGH THERE IS SOME EVIDENCE THAT A PLATEAU HAS BEEN~~
~~REACHED.~~ ^{INCREASE PARALLELS} ~~DOUBLING RATE EQUALS~~ INCIDENTALLY, THIS, ~~DOUBLING RATE EQUALS~~ THAT OF PETROCHEMICALS
PRODUCTION MENTIONED EARLIER. ALTHOUGH THIS DOES NOT PROVE A CAUSAL RELA-
TIONSHIP, THIS OBSERVATION COUPLED WITH MANY OTHERS SUGGESTS THAT CHEMICALS
AND OTHER SOURCES OF POLLUTION CONTRIBUTE SIGNIFICANTLY TO OUR OCCUPATIONAL
AND ENVIRONMENTAL HEALTH PROBLEMS, AND HENCE TO A LARGE PART OF OUR GENERAL
HEALTH PROBLEMS.

-10-

EMPHYSEMA AND CHRONIC BRONCHITIS COMPRISE 75% AND 19%, RESPECTIVELY, OF ALL REPORTED (NON-CANCER) RESPIRATORY DISEASES,¹⁶ WHICH ACCOUNTS FOR MORE DAYS AWAY FROM WORK AND SCHOOL THAN ALL OTHER DISEASES COMBINED, AND WHICH CAUSES MORE THAN ONE BILLION DAYS LOST FROM WORK ANNUALLY.¹⁷ ONE INSURANCE COMPANY REPORTS ON THE PREVALENCE OF CHRONIC RESPIRATORY DISEASES:

MORE THAN 30,000 DEATHS ARE ATTRIBUTED EACH YEAR TO THE CHRONIC RESPIRATORY DISEASES AS THE PRIMARY CAUSE OF DEATH;... ONE INQUIRY INTO THE PRESENCE AND SEVERITY OF CHRONIC RESPIRATORY DISEASES IN DEATHS OF PERSONS AGED 35-74 INDICATED THAT THE PREVALENCE OF THESE DISEASES AT TIMES OF DEATH WAS MORE THAN NINE TIMES GREATER THAN THAT REPORTED FOR THESE DISEASES AS THE UNDERLYING CAUSE OF DEATH. THE CONSENSUS IS THAT EXISTING CODING PRACTICES HAVE THE EFFECT OF UNDERESTIMATING THE CONTRIBUTION OF CHRONIC RESPIRATORY DISEASES TO MORTALITY IN THE UNITED STATES, (EMPHASIS ADDED). (18)

THUS, THE ESTIMATE BY THE NATIONAL LUNG AND HEART INSTITUTE TASK FORCE REPORT ON RESPIRATORY DISEASES THAT, EXCLUDING CANCER AND CERTAIN OTHER RESPIRATORY DISEASES, 150,000 DEATHS ANNUALLY OCCUR AS A RESULT OF RESPIRATORY DISEASE SEEMS REALISTIC.¹⁹

MUCH OF THE RESPIRATORY DISEASE WHICH PLAGUES THE WORKER IS ALSO KNOWN TO BE JOB-RELATED. BOTH "SPECIFIC" DISEASES SUCH AS COAL WORKERS' PNEUMOCONIOSIS AND GENERAL EMPHYSEMA AND CHRONIC BRONCHITIS CAN BE OF OCCUPATIONAL ORIGIN. THE PRESIDENT'S SCIENCE ADVISORY COMMITTEE CONSERVATIVELY ESTIMATES THAT AT LEAST 9,000 DEATHS ANNUALLY HAVE OCCUPATIONAL RESPIRATORY DISEASE AS A PRIMARY CONTRIBUTING CAUSE. THEIR ESTIMATE FOR DEATHS LINKED TO AIR POLLUTION ALSO NUMBERS 9,000.²⁰ (NOTE: THE SUM OF THESE ESTIMATES FOR OCCUPATIONAL AND NON-OCCUPATIONAL RESPIRATORY DISEASE IS 18,000. IF, AS HAS BEEN SUGGESTED, AN UNDERREPORTING OF RESPIRATORY DISEASE BY A FACTOR OF FIVE OCCURS, AND HALF OF THIS RESPIRATORY DISEASE IS WORK-RELATED, OCCUPATIONAL RESPIRATORY DISEASE COULD CONTRIBUTE AS MUCH AS $\frac{1}{2} \times 9 \times 30,000$ OR 135,000 DEATHS DUE TO OCCUPATIONAL RESPIRATORY DISEASES. THIS FIGURE MAY BE AN UPPER LIMIT, BUT THERE IS NO WAY TO TEST ITS ACCURACY WITH THE PRESENT DATA. THE ABOVE DISCUSSION REPRESENTS ALTERNATIVE PATHWAYS FOR ASSESSING THE POSSIBLE MAGNITUDE OF OCCUPATIONAL DISEASE. IF WE DECIDE TO BE MUCH MORE

-11-

CAUTERATIVE IN OUR ESTIMATES OF OCCUPATIONAL DISEASE INCIDENCE

~~162,000~~ -- IN GOOD AGREEMENT WITH THE ~~159,000~~ ESTIMATED BY THE ~~NATIONAL~~
~~LUNG AND HEART INSTITUTE~~ ^{AND ASSOCIATES} ~~), EVEN IF~~ ONLY 5% OF HEART DISEASE, CANCER, AND
 RESPIRATORY DISEASE WERE IN FACT OCCUPATIONALLY RELATED, THE ANNUAL NUMBER
 OF OCCUPATIONALLY CAUSED DEATHS WOULD BE 60,000. THUS THE PUBLIC HEALTH
 SERVICE ESTIMATE OF "AS MANY AS 100,000" MAY NOT BE UNREASONABLE.

MENTAL ILLNESS IS ANOTHER LEADING PUBLIC HEALTH PROBLEM WHICH MAY
 BE FAR MORE EXTENSIVELY JOB-RELATED THAN IS PRESENTLY REALIZED. THE CON-
 TRIBUTION OF OCCUPATIONAL STRESS AND HAZARDOUS, UNPLEASANT, OR MONOTONOUS
 WORKING CONDITIONS TO THE PROMOTION OF MENTAL ILLNESS IS NOT WELL UNDER-
 STOOD. AT THE PRESENT TIME, THOUGH, THE INCIDENCE OF MENTAL HEALTH PROB-
 LEMS IS KNOWN TO BE SUBSTANTIAL AMONG CERTAIN OCCUPATIONAL GROUPS,²¹
 RECENT EVIDENCE THAT CERTAIN PREVALENT FORMS OF MENTAL ILLNESS, SUCH AS
 SCHIZOPHRENIA, MAY BE CAUSED BY CHEMICAL AGENTS ADDS ANOTHER DIMENSION,
 POTENTIALLY OF GREAT IMPORTANCE, TO THE POSSIBLE LINKS BETWEEN OCCUPA-
 TIONAL FACTORS AND MENTAL HEALTH PROBLEMS.

A NIOSH-SPONSORED STUDY THAT WAS RECENTLY COMPLETED BY THE
 UNIVERSITY OF WASHINGTON²² INDICATES THAT 31% OF OVER 1,100 MEDICAL CONDI-
 TIONS FOUND IN 993 PARTICIPANTS WERE OF PROBABLE OCCUPATIONAL ORIGIN, WITH
 AN ADDITIONAL 10% "SUGGESTIVE HISTORY". THE PROBABLE OCCUPATIONAL DISEASE
 INCIDENCE WAS 23.4 PER HUNDRED WORKERS. ONLY 2% OF THIS OCCUPATIONAL
 ILLNESS WAS REPORTED ON THE EMPLOYER'S LOGS REQUIRED TO BE KEPT FOR THE
 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) -- AND ONLY 3% WAS
 FOUND IN WORKERS' COMPENSATION RECORDS.

* THE PARTICIPANTS IN THE STUDY WERE ADMITTEDLY NOT CHOSEN FROM A
 RANDOM SELECTION OF INDUSTRIES. WHAT IS IMPORTANT TO NOTE, HOWEVER, IS THAT
 SO LITTLE OF THIS OCCUPATIONAL DISEASE WAS REPORTED.

-12-

THE OCCUPATIONAL DISEASE PROFILE IN THE STUDY INDICATES THAT SKIN DISEASES, ONCE THOUGHT TO COMPRISE THE BULK OF OCCUPATIONAL DISEASE, ACCOUNT FOR ONLY 18%. HEARING LOSS CLAIMS 28%. THE REMAINING 54% ARE EXPLAINED BY RESPIRATORY CONDITIONS, TOXIC EFFECTS, EYE CONDITIONS, ANEMIA AND DISEASES OF THE MUSCULOSKELETAL AND CONNECTIVE TISSUES. THIS SURVEY ^{CORROBORATES} ~~CONFIRMS~~ WHAT THE PREVIOUS EPIDEMIOLOGICAL STUDIES SUGGESTED. A LARGE AMOUNT OF SERIOUS DISEASE, ^{COULD BE} ~~IS~~ OF OCCUPATIONAL ORIGIN. (SEE TABLE II.)

THE ABOVE DISCUSSION TOUCHES ONLY LIGHTLY ON THE NATURE AND DIMENSIONS OF OCCUPATIONAL AND ENVIRONMENTAL DISEASE. THERE ARE, OF COURSE, NUMEROUS DETAILED EPIDEMIOLOGICAL STUDIES LINKING SPECIFIC OCCUPATIONAL HAZARDS TO DISEASE, E.G., CHROMATE AND ARSENIC LINKED CANCER. HONEST PEOPLE WILL DIFFER AS TO WHERE ON THE SPECTRUM OF EVIDENCE FROM SUGGESTIVE TO CONCLUSIVE ANY PARTICULAR STUDY LIES. MANY OF THE PARTICIPANTS OF THIS CONFERENCE WILL HAVE, OR KNOW OF, ADDITIONAL INFORMATION SOURCES. MY OWN OBSERVATION IS AS FOLLOWS: IN THE FOUR YEARS DURING WHICH I HAVE BEEN WRITING AND SPEAKING ON THESE ISSUES, I HAVE WITNESSED STUDY AFTER STUDY REVEAL MORE AND MORE DISEASE TO BE OF OCCUPATIONAL ORIGIN. I AM AFRAID WE ARE SITTING ON TOP OF A VERY REAL AND, UNFORTUNATELY, LARGE OCCUPATIONAL DISEASE PROBLEM.

THOSE WHO ARGUE HONESTLY ABOUT THE VALIDITY OF ANY PARTICULAR STUDY WILL SERVE THE VALUABLE FUNCTION OF ENCOURAGING RESPONSIBLE RESEARCH EFFORTS. HOWEVER, THE POLICY QUESTION IS REALLY FOCUSED ON WHAT QUALITY OF EVIDENCE IS REQUIRED IN ORDER TO TAKE POLITICAL AND AMELIORATIVE ACTION.

THE PRESENT COSTS OF WORKERS' COMPENSATION, OF COURSE, DO NOT REFLECT COMPENSATION FOR MOST OCCUPATIONAL DISEASE. THE PROJECTED COSTS WOULD DEPEND UPON WHETHER IMPAIRMENT AS WELL AS DISABILITY WERE COMPENSATED AND ON COMPENSATION SCHEDULES FOR VARIOUS DEGREES OF FUNCTIONAL DISABILITY. IT IS WORTH NOTING THAT CHRONIC DISEASE WHICH CAN LEAVE A WORKER IMPAIRED FOR MANY YEARS -- OFTEN WITH HIS CONDITION WORSENING OVER TIME -- COULD RUN UP THE COSTS OF WORKERS' COMPENSATION, EVEN IF COMPENSATION WERE CONSERVATIVELY AWARDED IN EACH INSTANCE. OCCUPATIONAL DISEASE IMPOSES A LARGE SOCIAL COST ON THOSE AFFLICTED. IT SHOULD BE NO SURPRISE, THEREFORE, THAT INTERNALIZING THESE COSTS THROUGH WORKERS' COMPENSATION WOULD ALSO BE LARGE.

TABLE I
COMMON OCCUPATIONAL CARCINOGENS

Agent	Organ Affected	Occupation
Wood	Nasal cavity and sinuses	Woodworkers
Leather	Nasal cavity and sinuses; urinary bladder	Leather and shoe workers
Iron oxide	Lung; larynx	Iron ore miners; metal grinders and polishers silver finishers; iron foundry workers
Nickel	Nasal sinuses; lung	Nickel smelters, mixers, and roasters; electrolysis workers
Arsenic	Skin; lung; liver	Miners; smelters; insecticide makers and sprayers; tanners; chemical workers; oil refiners; vintners
Chromium	Nasal cavity and sinuses; lung; larynx	Chromium producers, processors, and users; acetylene and aniline workers; bleachers; glass, pottery, and linoleum workers; battery makers
Asbestos	Lung (pleural and peritoneal mesothelioma)	Miners; millers; textile, insulation, and shipyard workers
Petroleum, petroleum coke, wax, creosote, shale, and mineral oils	Nasal cavity; larynx; lung; skin; scrotum	Contact with lubricating, cooling, paraffin or wax fuel oils or coke; rubber fillers; retort workers; textile weavers; diesel jet testers
Mustard gas	Larynx; lung; trachea; bronchi	Mustard gas workers
Vinyl chloride	Liver; brain	Plastic workers
Bis-chloromethyl ether, chloromethyl methyl ether	Lung	Chemical workers
Isopropyl oil	Nasal cavity	Isopropyl oil producers
Coal soot, coal tar, other products of coal combustion	Lung; larynx; skin; scrotum; urinary bladder	Gas house workers, stokers, and producers; asphalt, coal tar, and pitch workers; coke oven workers; miners; still cleaners
Benzene	Bone marrow	Explosives, benzene, or rubber cement workers; distillers; dye users; painters; shoemakers
Auramine, benzidine, alpha-Naphthylamine, magenta, 4-Aminodiphenyl, 4-Nitrodiphenyl	Urinary bladder	Dyestuffs manufacturers and users; rubber workers (pressmen, filtermen, laborers); textile dyers; paint manufacturers

SOURCE: NATIONAL CANCER INSTITUTE, AS QUOTED IN HEALTH & WORK IN AMERICA:
A CHART BOOK, AMERICAN PUBLIC HEALTH ASSOCIATION, WASHINGTON, D.C.,
NOVEMBER 1975, p.71

TABLE II

Medical Conditions by Occupational Relationship

Condition	Probable Occupational Disease ¹		Can't Evaluate ² and Doubtful ³	Suggestive History ⁴	Probable Nonoccupational Disease ⁵
Anemia and other blood diseases	49	7	21	1	20
Conjunctivitis and other diseases of the eye	74	31	1	24	18
Refractive errors	84	0	1	0	83
Hearing loss, mild	86	68	12	0	6
Hearing loss, moderate	32	26	4	0	2
Hearing loss, advanced	4	2	2	0	0
Hearing loss, possible threshold	16	0	16	0	0
Hypertension	138	1	0	0	137
Heart disease	14	0	1	0	13
Other diseases of the circulatory system	3	0	0	0	3
Respiratory conditions excluding upper	289	49	76	11	153
Upper respiratory conditions	73	38	2	21	12
Skin conditions	128	64	4	35	25
Diseases of musculoskeletal and connective tissues	28	9	2	7	10
Symptoms and ill-defined conditions	17	1	6	1	9
Nonsymptomatic conditions	27	27	0	0	0
Toxic and other adverse effects	23	9	1	13	0
Low-grade toxic effects	14	13	1	0	0
Other conditions	17	1	1	0	15
Total	1116	346	151	113	506

1. Manifestations of disease are consistent with those known to result from excessive exposure to a given injurious agent; this injurious agent is present in the patient's working environment, and significant contact in the course of usual duties is likely.

2. An association between the disease and occupational factors has never been clearly established (e.g., cardiovascular disease, respiratory infections, mental and psychoneurotic episodes).

3. Manifestations of disease are not entirely consistent with those known to result from excessive exposure to an injurious agent or manifestations of illness are consistent with those known but no significant contact with the alleged injurious agent can be established.

4. Manifestations of disease as given in history are consistent with those known to result from excessive exposure to a given injurious agent; this exposure is taking place or has taken place; there is no objective evidence of disease at the time of the medical examination.

5. Manifestations of disease but no relationship to occupational exposures.

Source: D. P. Dasher et al., *Pilot Study for Development of an Occupational Disease Surveillance Method*, HEW Publication No. (NIOSH) 75-162.

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Multiple Factor Interactions in Occupational Disease

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Introduction

In the setting of standards for permissible exposures to agents which might cause occupational disease, there is acknowledgement that there is no necessary uniformity of response. This is reflected in the inclusion of "safety factors" in calculating such standards. In the past decade, observations have been made which suggest that this precaution, albeit correct, is inadequate, meager and conceptually much too narrow. The complexity of the work environment and the worker's response to toxic substances, are much more varied than anticipated and consideration of occupational disease should include understanding of a wide spectrum of potential interactions.¹

One cause-one effect concept

For most occupational diseases, there appears to be unquestioning acceptance of a one cause-one effect etiology. This has resulted in threshold limit values or maximum allowable concentrations or similar exposure standards being set for specific substances. There are TLVs, for silica, vinyl chloride, beryllium, carbon monoxide, carbon tetrachloride, arsenic, and many other agents.

This concept has developed over the past century, being firmly grounded in the initial observations concerning the specificity of the effects of lead and mercury in Great Britain. It has been a fertile perspective, and has helped establish much of our current knowledge concerning occupational disease. Its usefulness can perhaps be better appreciated when we consider the contradictory and diffuse situation which obtained at the turn of the century. It was known then that dust, fumes and vapors could cause lung disease. Agricola had written almost four hundred years before of lung disease in Saxony mines² [mines which later yielded

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-2-

the knowledge of radiation lung cancer³] and the grinding wheels of the late 1800s were clearly shortening the lives of the workers using them. Yet, little could be said definitively. Some dust exposed workers, as farm laborers, did not have lung disease and often had appreciably longer life spans than the population in general, while others, as Scottish coal miners, did not suffer evident ill health.⁴

The brilliant contribution by Collis clarified the situation, in the Milroy Lecture of 1915.⁵ He showed, for the first time, that a specific dust, crystalline silica, had a biologically unique effect. Workers exposed to dusts with high concentrations of silica died much more frequently of tuberculosis than workers exposed to dust of other composition. Demonstrating this effect, Collis gave new meaning to the word "pneumoconiosis" introduced fifty years before.⁶ From this time on, it was no longer a disease, but a general term which covered a variety of dust diseases of the lung, soon compartmentalized into many categories (silicosis, asbestosis, beryllium lung disease, coal workers pneumoconiosis, aluminosis, and others), characterized by the presence of pulmonary reaction (fibrosis) to dust in the lung. Two important perspectives seemed to flow from these observations. First, was the stricture that there should be a one cause/one effect relationship between agent and reaction to it. This appeared a good biological principle and consistent with observations then being rapidly made in infectious disease studies, where tuberculosis was due to the tubercle bacillus, diphtheria to the diphtheria bacillus, scarlet fever to the streptococcus. Second, conversely, specific reactions were expected after exposure to specific substances. When it was finally agreed, for example, that asbestos (with little or no free silica) could cause lung disease,⁷ it was reasonable to find that the fibrosis it produced was diffuse rather than nodular.⁸

There was further reason to broadly accept these perspectives. They were practical, productive, orderly. With them, we have been able to sort out the biological potential of various metals, finding that some, as iron or tin,⁹ produced little pulmonary reaction while others, as beryllium, gave serious disease.¹⁰ Even today, it makes good sense to isolate a substance in the human environment, as far as possible, to study its effects, and this technique is almost universally used in animal investigations.

Nevertheless, however well this concept has served us to this point, there is now a growing realization that it is incomplete and restrictive and occasionally, even inappropriate or misleading.¹¹

Concurrent exposure to multiple agents in the work environment

Single agents in the work place are the exception rather than the rule. Multiple exposures are much more common. When they occur, the effects can be varied and, often, unpredictable. Thus, when agents have the same toxic potential, summation of effects may be anticipated; this may be the case where neurotoxic solvents of like toxicity are used. On the other hand, the toxic effects may be distinct and related to the unique properties of the several agents. It is even possible that the effects may be multiplicative rather than additive, or even less than additive. We have comparatively little information on the effects of the various combinations, and it should be anticipated that in the next years much more will be known about this problem.

The range of possibilities may be hinted at by a few examples. Vinyl chloride polymerization workers are exposed to the monomer; they are also exposed to a variety of additives, each of which may have its own biological potential, and even to polyvinyl chloride particles. It may be that the latter play a greater or lesser role in the pulmonary changes that are sometimes seen in vinyl chloride polymerization workers.^{12,13} To further depict the complexity of evaluation of toxic effects associated with vinyl chloride monomer exposure, one need but to recall that this monomer often accompanies others in the manufacture of co-polymers. These others may exhibit their own toxicity, as would be the case with vinylidene chloride or styrene.

Coal miners are exposed not only to mining dust, but to nitrous oxides and to diesel fuels. Even the coal dust is by no means a single substance varying, as it does, in silica content, for example.¹⁴ The range of variability in coal dust is reflected in differences in incidence and type of respiratory disease among coal miners.¹⁵

Physical interactions may also be significant. Thus, inert particles may adsorb and potentiate noxious gases, as sulfur oxides and nitrous oxides, or carcinogenic materials. Little is known about interaction with physical environments (heat, cold, radiation) although clinical suspicion exists that these are important. There may be no such thing as an "inert dust," innocuous in all circumstances. The total dust burden of the lung in respiratory disease among coal miners, for example, plays a pathogenetic role, perhaps by mechanical effect on lymphatic and bronchial clearance. Thus, while dose-disease response relationships are generally valid and provide firm grounding for the concept of threshold limit values (see above), in some circumstances the relationship is hardly straight-line. Changes in quantity may be associated with qualitative differences. Clearance mechanisms ordinarily entirely adequate to prevent undue accumulations of dust, whatever their fibrogenic potential, may be overwhelmed and the inhaled dust can then produce significant changes. An analogous situation exists with exposures to irritating fumes and vapors, where the repair processes of bronchial and alveolar tissues can be out-run.

Similar complexities exist with other mining and smelter operations. Primary lead smelter workers are often exposed not only to lead but to arsenic and cadmium as well and, in the smelting operation, to sulfur oxides and a number of dusts. Talc mining and milling may include exposure to a variety of minerals; true talc, chrysotile, anthophyllite, tremolite. Asbestos mining and milling may result in hazards not only due to the asbestiform fibers, but to silica and perhaps other minerals as well. Even the use of asbestos in industry may include exposure to calcined diatomaceous earth, cristabolite and a variety of other substances.

Recently, this has become a very practical problem. Although attention had previously been called to the possibility that the host rock in mines being exploited for the extraction of specific metals might be of disease significance,¹⁶ the recent Reserve mining case has given the possibility considerable urgency.¹⁷ Although the Reserve Mining Company was exploiting its taconite deposits for the preparation of iron pellets, in doing so it had to crush and dispose of large amounts of rock. The

tailings from this operation were then deposited into Lake Superior. The discovery that these tailings contained large numbers of amphibole asbestiform fibrous minerals has resulted in recognition of a serious potential hazard. It is evident that we need now look to the many mining operations in this and other countries to determine whether they might be associated with risk derived from exposure to fibrogenic and/or carcinogenic mineral dusts derived from the host rock, not previously suspected of being a source of hazard. Since amphibole makes up a good part of the earth's crust, the question is hardly an academic one.

Compound and variable agents

Not infrequently, occupational exposures to "multiple agents" occurs naturally. This is almost invariably the case with mineral dust. Ores are complex mixtures of minerals, often varying from seam to seam. The extraction and beneficiation processes rarely result in uncontaminated, unique, single substances, since such purity is generally prohibitively expensive and but infrequently needed. Exposures therefore include the possibility of effects as different as the different substances present. Nor should we anticipate that even this admixture of effects will be the same at each point in the extraction, beneficiation and use of the material, since the proportions of the several substances will vary at each point in the vertical process of preparation and utilization. It is inadequate, as noted, to speak of exposure to coal dust or to asbestos or to talc. Miners may inhale varying amounts of quartz while quarrying tin,⁹ mica¹⁸ or talc.¹⁹ It is instructive to recollect that the pathogenic properties of coal dust per se were first isolated by demonstrating disease in coal handlers engaged in transportation, away from the mines²⁰ and disease with graphite reflects contributions both from its carbon and its silica content.²¹ Failure to recognize the potential effect of such admixtures, long delayed the recognition of possible fibrogenic effects of bentonite.²² A further interesting example of the complexity of the problem, is lung disease associated with diatomaceous earth exposure; this material may give little or no trouble unless its amorphous silica is altered to crystalline tridymite or cristobolite by calcining (such crystalline variants may sometimes be present in diatomaceous earth deposits as the result of changes in the geological history of the deposit). Shaver's disease has also been studied not only in

relation to aluminum ore, but to particle size and silica content,²³ and hard-metal pneumoconiosis²⁴ is so named because of the varying materials involved in its causation.

Several additional examples will help point the problem. Solvents used in industry often contain benzene as a contaminant; trace substances (additives) may be present in cutting oils and, in view of the proprietary nature of these products, it is very difficult to know exactly what these substances might be; coal tar pitches and asphalts may vary in their exact chemical composition according to both the source of the raw material and the nature of the manufacturing process; abrasive soap mixtures may contain fine sand mixed with either acid or alkalies, potentially altering the effect of the fine silica in the ensuing abrasive soap pneumoconiosis; respiratory disease as a result of detergent enzyme exposure may again reflect exposure to variable substances.^{25,26}

To complicate the matter further, substances may vary in their effect not only virtue of their chemical and physical composition, but also because of particle size and shape. This has recently been suggested for fibrous glass, as well as other biologically active fibers.²⁷

Multiple effects of individual substances

Some agents, in and of themselves, may have more than one biological effect. Asbestos can produce both pulmonary fibrosis and a variety of neoplasms (lung cancer, pleural and peritoneal mesothelioma, cancer of the esophagus, stomach, colon and rectum,²⁸ as well as more uncommon neoplasms such as cancer of the larynx²⁹ and oro-pharynx.³⁰) Aluminum dust may result in pulmonary fibrosis, and spontaneous pneumothorax. Calcined diatomaceous earth may give the same pair of effects. The several varieties of extrinsic allergic alveolitis may be marked both by bronchial disease and by significant pulmonary fibrosis, as is the case in farmers lung.³¹ Radiation can produce both fibrosis as well as cancer,³² manganese can produce Parkinsonism as well as pneumonitis³³ and caisson workers may be found to have lung cysts in addition to bone changes.³⁴

Incomplete appreciation of the multiplicity of potential disease effects with biologically active agents perhaps slowed our recognition of the

carcinogenicity of vinyl chloride^{35,36}; we had long been aware of other toxic manifestations.³⁷

Interaction of occupational and non-occupational factors in the development of occupational disease

Just as exposures in the work place may be variable, so might the workers' response to them. In general terms, this has long been known; not all miners develop pneumoconiosis nor all sand-hogs the "bends." While some instances are known in which virtually all workers exposed to aromatic amines developed bladder cancer,³⁸ this is unusual. More commonly, exposure to occupational carcinogens will result in cancer in some individuals and not in others.

This variability in human response can be quantitatively demonstrated among asbestos workers. Table 1 records the prevalence of x-ray changes consistent with parenchymal and pleural asbestos disease among asbestos insulation workers in the New York metropolitan area. While the prevalence of such changes was high among the workers with long exposure, even among those with 40 or more years from onset of exposure, 5% had no evidence of radiological abnormality, despite having had the same exposures over the years as their colleagues. Lung cancer has been common among these men (table 2); approximately one in five deaths is so related. This, however, is another way of saying that four out of five of these workers do not die of this neoplasm. If approximately one in 15 has been found to die of mesothelioma, 14 died of other causes. The same range of human variability has been found even in circumstances in which work environment variables could be excluded. Among workers employed in an amosite asbestos products factory 1941-1945, and traced through 1974, very much the same spectrum of neoplasms was found³⁹ (table 3), despite the fact that they were all employed in the same factory, at the same time, in the same city, during the same decade, making the same products of the same fiber, with the same machinery.

We are only beginning to ferret out some of the influences which make for this variability of response. Some differences are sex-related. Thus, women may react differently than men to lead exposure, particularly during pregnancy.⁴⁰ Recently, similar sex-related variations in reaction have been identified for polychlorinated biphenyls.⁴¹ Individual variations

as the result of genetic, immunological and metabolic factors occur. The possible effects of infection have been pointed to for some time,^{42,43} and the recent identification of the importance of α_1 -antitrypsin deficiency in the pathogenesis of some cases of emphysema^{44,45} has attracted much needed attention to this field of research. It has also been proposed that similar genetic defects may eventually explain lung cancer response among some people and not in others.⁴⁶ Similarly, immunological responses, including auto-immune reactions, to pneumoconiotic dusts have been proposed to explain fibrosis,^{47,48} as well as the occurrence of Goodpasture's syndrome following the inhalation of industrial solvents.^{49,50} Acquired allergy is commonly seen among cement workers and those suffering from occupational asthma or extrinsic allergic alveolitis.

The interaction of carbon tetrachloride exposure and alcohol consumption is well known; fatal hepatic reactions to the solvent are much more likely to occur among individuals who have taken alcoholic beverages, sometimes in surprisingly small quantities.

A variety of interactions between occupational agents and drugs taken by the worker are possible. An example would be the additive effect of sedatives and neurotoxic solvents; this may not be unimportant for a worker high on a scaffold at a construction site, for example. But such simple situations may not be the whole story. For example, drugs as phenobarbital may alter the hepatic enzyme balance with concomitant alteration of the metabolism of carcinogenic polycyclic aromatic hydrocarbons. Conversely, polychlorinated biphenyls are also powerful hepatic enzyme inducers and may alter the reaction to therapeutic drugs taken by the individual. Investigations have demonstrated⁵¹ that excessive lead exposure may also effect metabolism of such drugs as antipyrine and phenylbutazone.

It is evident that little is yet known about such interactions, with many other probable causes still obscure; these may include physiological factors associated with age and nutrition.⁵² It may turn out that much occupational disease would not occur except with interaction of two or more agents including those in the work environment and those inherent in the individual.

Cigarette smoking

The potential importance of interaction between occupational and non-occupational factors in the development of occupational disease has perhaps been best illustrated by study of the effect of cigarette smoking.

The first well defined report on the powerful effect of smoking on occupational disease was that of Sluis-Cremer and his colleagues.⁵³ He demonstrated that the incidence of bronchitis among gold miners depended upon whether or not they also smoked cigarettes; if they didn't, they had no greater risk than similar adult males in the same community. Soon afterwards, Lowe demonstrated that it was difficult to isolate the effect of an adverse occupational environmental, as in SO₂-rich steel mills, because of the overriding influence of cigarette smoking.⁵⁴ Data have also been reported showing the importance of such interaction with asbestosis,⁵⁵ coal mining⁵⁶ and cement work.⁵⁷

Attention has also been attracted to the influence of cigarette smoking in the etiology of occupational cancer. This was first demonstrated in 1967.⁵⁸ Evidence had previously been provided, 1935-1965, of the increased risk of bronchogenic carcinoma with occupational exposure to asbestos.^{59,60,61} It was found, however, that the risk did not depend on asbestos alone. Rather, if there were not concordance of two agents -- cigarette smoking and asbestos -- the tumor was uncommon.⁵⁸

In 1963, prospective observation was begun of 370 long-exposed asbestos insulation workers in the New York metropolitan area. By April 30, 1967, no death from lung cancer had occurred among the 87 men with no history of cigarette smoking, despite their many years of occupational exposure to asbestos. In contrast, 24 deaths from lung cancer occurred among the 283 men with a history of cigarette smoking, although only 2.98 such deaths had been expected. It was suggested at the time that the combination of the two factors -- asbestos greatly increasing the lung cancer risk of cigarette smoking -- had a sharp, multiplying effect. It was calculated that an asbestos worker who smoked cigarettes had eight times the risk compared to smokers of the same age who did not work with asbestos, and 92 times the risk of men who neither worked with asbestos nor smoked cigarettes.⁵⁸

-10-

These findings were based upon limited observations, especially with regard to non-smokers. Therefore, additional investigations were undertaken. First, the survivors of the original group of 370 men were followed to December 31, 1973. Altogether, 191 died from 1963 to 1973. Among the 87 men with no history of cigarette smoking, two deaths (of 41) occurred from lung cancer; both men smoked pipes or cigars. Of the 283 with a history of regular cigarette smoking, there were 150 deaths, 45 of lung cancer (table 4).

A second, much larger, study was undertaken, especially to investigate whether asbestos exposure without cigarette smoking truly did not increase the risk of lung cancer significantly, particularly since such exposure was clearly associated with cancer risk at other sites (peritoneum, gastrointestinal tract) in non-smokers. On January 1, 1967, the entire membership of the insulation workers union in the United States and Canada* were registered and we have observed the group since. When these men were enrolled in the study, each was asked to record his lifetime smoking habits. 9,590 indicated that they were either then smoking cigarettes, or had previously smoked regularly. 690 had a history of smoking pipes/or cigars, but no cigarettes. 1,457 had never smoked regularly at all. Smoking habits were not recorded for 6,144 men.

Analysis of lung cancer deaths among the 17,800 men to December 31, 1972 showed that the increased risk of this neoplasm was limited to asbestos workers who also had a history of cigarette smoking. Among the 9,590 cigarette smokers, there were 179 deaths from lung cancer (of 640 all told); of the 2,066 men with no history of cigarette smoking, only two (of 93 total) died of lung cancer (table 5). Unfortunately, data are not yet available detailing lung cancer risk specifically for the amount and nature of smoking; these were available through 1965.⁶² Nevertheless, these new findings again demonstrate that asbestos workers who do not smoke or smoke only pipe and/or cigars, have about the same lung cancer risk as men not occupationally exposed to asbestos, despite their considerably increased risk of cancer of the stomach, colon and rectum.^{63,64}

*International Association of Heat and Frost Insulators and Asbestos Workers, AFL-CIO, CLC.

There is evidence that uranium mining and cigarette smoking also interact as multiple factors,⁶⁵ and a similar association between cigarette smoking and radiation has been noted among Hiroshima and Nagasaki atomic bomb survivors, with lung cancer disproportionately increased among those individuals who also have a history of cigarette smoking.⁶⁶

As noted, the multiple factor interaction between asbestos and cigarette smoking is quite specific, having an influence for some types of asbestos cancers and not for others. For gastrointestinal cancer, asbestos workers who smoke cigarettes have no greater risk of cancer of the stomach, colon or rectum than do asbestos workers who do not smoke cigarettes.⁶⁷ On the other hand, cancer of the esophagus seems to be increased only among cigarette smoking asbestos workers, but not in those without such history.

Recent evidence from Japan suggests that the incidence of leukemia among radiation exposed survivors at Hiroshima and Nagasaki is augmented by occupational exposure to benzene in the years after radiation exposure.⁶⁸

Relevance to workmen's compensation

The extension of our knowledge concerning the conditions in which occupational disease may occur potentially enriches efforts associated with its management and control. Workmen Compensation procedures should be no exception. The impact of these recent findings will be briefly considered under three headings.

Causation

Workmens' Compensation statutes frequently refer to disease produced by specific agents. As detailed in the foregoing, such categorization may be inappropriate, at least in some instances. Not only are exposures to single agents not always the rule, but the exact nature of the exposures may be incompletely known. This is especially the case for occupational disease with long periods of clinical latency,⁶⁹ in which the exact exposures may be obscure or unrecorded. Even with recent exposures, the analytical facilities that would be needed to sort out the exact agents involved are often not available or not utilized. The toxicological expertise that would be needed for such exact analysis on a broad scale are

-12-

generally not at hand. Analysis can be undertaken for research purposes and can give reliable qualitative answers (quantitative measurements, post hoc, are hardly to be expected) but it can turn out just as well that, by the time the research studies are done, the materials in question (because they have been questioned!) may no longer be used, with other agents substituted in their stead.

Nor do quantitative estimates of exposure always provide a firm basis for evaluation. The range of variability of human response has been noted, and there are few data which indicate that current threshold levels encompass the full range of such variability. While TLVs may provide good general guides, more than that is hardly claimed for them.

Extent of disability

Just as there is wide variation in worker response to toxic agents in the work environment, there is equal variation in the degree of disease response and consequent disability. Exposure, even "excessive" exposure, is by no means synonymous with disability, nor can the individual worker's difficulties be predicted on the basis of what we know of the intensity and duration of exposure. Each case must be decided on its own merits.

In the same vein, it would be well to keep an open mind on the effects of toxic exposures, even for agents that have long been with us. Vinyl chloride and asbestos are two examples. For the former, hepatic effects were first reported in 1949,⁷⁰ acroosteolysis in 1966,⁷¹ angiosarcoma of the liver in workers in 1974,⁷² with the importance of Banti's syndrome noted in the same year.⁷³ For asbestos, asbestosis was identified in 1924 and 1927,^{74,7} lung cancer in 1935,⁵⁹ pleural mesothelioma in 1953⁷⁵ peritoneal mesothelioma in 1954,⁷⁶ and gastrointestinal cancer in 1964.⁶¹

Occupational and non-occupational factors

The question is sometimes raised whether occupational factors must be burdened with the responsibility for disease when, in the absence of non-occupational factors, work exposure would be unlikely to produce such results. There is, of course, wide experience with this problem, which is essentially a legal and administrative one, rather than scientific. In the instances in which quantitative data are available^{53,58} (multiple factor interactions with cigarette smoking), it is clear that occupational exposure sharply increases the risk that would otherwise obtain with the

individual's cigarette smoking. There would thus appear to be little doubt that the occupational exposure should be judged responsible for the increased disease risk found among workers in an exposed group.⁷⁸

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Table 1

X-ray changes in asbestos insulation workers

Onset of exposure (yrs.)	No.	%	%	Asbestosis (grade)		
				1	2	3
40+	121	5.8	94.2	35	51	28
30-39	194	12.9	87.1	102	49	18
20-29	77	27.2	72.8	35	17	4
10-19	379	55.9	44.1	158	0	0
0-9	346	89.6	10.4	36	0	0
	1,117	51.5	48.5	366	126	50

Table 2

Expected and observed deaths among 632
N.Y.-N.J. asbestos insulation workers,
January 1, 1943-December 31, 1974

	<u>Expected*</u>	<u>Observed</u>
<u>Total deaths, all causes</u>	305.20	451
<u>Total cancer - all sites</u>	52.02	200
Lung cancer	12.20	89
Pleural mesothelioma	**	10
Peritoneal mesothelioma	**	25
Cancer of stomach, esophagus	6.46	20
Cancer of colon	7.64	23
<u>Asbestosis</u>	**	37
<u>All other causes</u>	253.18	214

*632 members were on the union's rolls on January 1, 1943. 9 died before reaching 20 years from first employment. All others entered these calculations upon reaching the 20-year from onset of first exposure point. Expected deaths are based upon white male age-specific death rate data of the U.S. National Office of Vital Statistics from 1947-72. Rates were extrapolated 1943-48 from rates for 1949-55, and for 1973-74 from rates for 1968-72.

**U.S. death rates not available, but these are rare causes of death in the general population.

Table 3

Deaths among 933^{*} workers employed in an amosite asbestos factory, starting five years from onset of work 1941-1945 to December 31, 1974

<u>Cause of death</u>	<u>Deaths 1946-1974</u>		
	<u>Expected</u>	<u>Observed</u>	<u>Ratio</u>
<u>All causes</u>	285.62	483	1.69
<u>Cancer - all sites</u>	50.10	157	3.13
Lung cancer	12.45	83	6.67
G.I. cancer	12.05	24	1.99
Pleural mesothelioma	***	5	
Peritoneal mesothelioma	***	5	
"Asbestos" cancer	24.50	117	4.78
Other cancer	25.60	40	1.56
<u>Asbestosis</u>	***	28	
<u>All other causes</u>	235.52	298	1.27

* Expected deaths are based upon white male age-specific death rate data of the U.S. National Office of Vital Statistics, 1949-1972. Rates were extrapolated for 1946-1948 from rates for 1949-1955 and for 1973-1974 from rates for 1968-1972.

128 workers were omitted from these calculations: 33 had prior asbestos exposure; 38 died in the first five years after onset of employment. 49 were not completely traced; and eight had other asbestos employment after the five year from onset point.

*** U.S. death rates not available but these are rare causes of death in the general population.

Table 4
Expected and observed deaths among 370 New York-New Jersey
asbestos insulation workers, January 1, 1963-December 31, 1973,
by smoking habits

	Number of men	Person-years of observation	Lung cancer			Cause of death		
			Expected ^a	Observed	Ratio	Pleural mesothelioma	Peritoneal mesothelioma	Asbestosis
History of cigarette smoking	203	2,195	4.07	45	11.06	7	14	19
Current smokers	181	1,443	2.48	32	12.09	6	7	12
Ex-smokers	102	752	1.59	13	0.18	1	7	7
No history of cigarette smoking	87	708	1.58	2	1.27	0	7	6
Never smoked	48	409	0.84	0	---	0	5	3
Pipe/cigar only	39	299	0.74	2	2.70	0	2	3

^a Expected deaths are based upon age-specific white male death rate data of the U.S. National Office of Vital Statistics from 1963-71, disregarding smoking habits. Rates were extrapolated from 1972-73 from rates for 1967-71.

Table 5

Expected and observed deaths of lung cancer
among 17,800 U.S. and Canada asbestos insulation
workers, January 1, 1967-December 31, 1972;
relation to cigarette smoking

	<u>No of persons</u>	<u>Deaths from lung cancer</u>		
		<u>Expected^a</u>	<u>Observed</u>	<u>Ratio</u>
Smoking habits not known	6,144	16.76	94	5.6
History of cigarette smoking	9,590	31.60	179	5.7
No history of cigarette smoking	2,066	7.51	2	0.3
Never smoked	1,457	4.40	1	0.2
History of pipe and/or cigar only	609	3.11	1	0.3

^a Expected deaths based upon age-specific U.S. mortality rates for white males, disregarding smoking. Lung cancer estimates based on U.S. rates for cancer of lung, pleura, bronchus and trachea, categories 162 and 163 of the International Classification of Diseases and Causes of Deaths, 7th Revision.

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MEDICAL ASPECTS

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BACKGROUND

MEDICAL ASPECTS OF DETERMINING CAUSALITY

ILLUSTRATIVE MEDICAL PROBLEMS

BERYLLIUM

CHROMATES

MULTIPLE EXPOSURES

INDUSTRIAL CANCERS

MEDICAL RECORDS AND OCCUPATIONAL DISEASE

OSHA STANDARDS AND COMPENSATION

RECOMMENDATIONS

GENERAL COMMENT

SUMMARY

BACKGROUND

The medical-legal problems associated with the administration of the State Compensation laws, represent sequential events derived mainly from the basic inequalities between the employee and the employers in terms of technical resources of knowledge, information and experience, that constitute the basis for informed judgment and direction in compensation cases.

Historically, there has always been this tremendous gap between the professional and technical resources available to the employers and not available to the man on the job. The employer begins with experience and a technical resource of staff and information inside and outside the company, that provides him with advice for whatever problem arises, production or compensation, and within the sphere of compensation all the legal and medical expertise that is desired is available to him. The company, not only can financially afford the expertise, but is also sufficiently educated to know where to seek and whom to obtain for whatever purpose or position is desired.

Such is certainly not the case for the worker in compensation. The contrast is to the other end of the scale. Yet, justice in compensation requires equality for both parties.

The second major problem, for decades, has been a fundamental nation-wide lack of recognition of occupational related illnesses, diseases and death, by the worker, and his family, by the doctor, by the industry, and by the government. This broad problem has contributed to the present difficulties in the medical evaluation of compensation cases.

BACKGROUND (continued)

This stems in general from the fact that for decades the workers, the doctors and society have been predominately oriented and trained on the infectious causes of disease, due to bacteria and viruses, and there has been a corresponding lack of realization of the impact of the many thousands of chemicals -- the micro-chemicals in the work environment-in the causation of illness, disease, and death.

Similarly, workers and industry have been trained and oriented to safety on the job, with the emphasis on accidental, traumatic injury -- what you can see happen. You see the cause, how the injury occurred, and you see the effect, loss of a finger, hand or life. What have not been emphasized are the chemical causes of disease, whose effects can certainly occur immediately, but most often are delayed for months or years. When the medical effects are not seen right away, the worker does not recognize the seriousness of the health risks at work that he is taking. Yet, the latent period, the interval of time, between exposure and development of the occupational cancers, for example, may be 30 to 40 years or more.

This lack of recognition of occupational disease and the effect of the micro-chemical environment also stems from the absence of the necessary studies, by the government, by industry and, by the scientific community, of the health hazards of the work environment in the millions of places of employment. Enough is already known of the toxic nature of approximately 500 chemical substances and injurious agents, in the air contaminant and other standards, to warrant vigorous investigation.

BACKGROUND (continued)

This lack of recognition of occupational toxic effects also extends to the impact of the several hundred thousand chemical trade-name products used in industry, whose chemical composition is not made known to the worker, nor to his doctor, nor to the government. There is no legal requirement that such information relative to the chemical composition and the toxic qualities of the chemicals in the trade-name products be filed with NIOSH for assistance in evaluating health problems. Further, there has never been any legal requirement for the pretesting of industrial chemicals prior to their use in industry, relative to the toxicological and carcinogenic effects on the workers.

In essence the industrialization proceeded at an ever expanding pace during the past decades, but there never was any concomitant recognition of the need to determine what would happen to the industrial population in terms of industrial chemicals.

MEDICAL ASPECTS OF DETERMINING CAUSALITY

I should like now to turn to the medical aspects of compensation. For this purpose I shall use a series of illustrative problems (as suggested by the planners of this Conference) to discuss some fundamental factors that influence the medical evaluation and determination whether a particular disease/illness is work-related. It is the experience of past medical problems, which can serve to define the difficulties and guide the direction for future improvement in compensation laws.

In order to provide some common thread to the considerations of the evaluation of the medical problems, of medical diagnosis, for the series of illustrations, they will be considered within certain broad frames of reference.

1. The attitude of the company to health problems, the acknowledgement or denial of health effects, and the economic costs of control, influence the presence or absence of industrial medical programs, the quality and level of performance and the nature and extent of medical and environmental surveillance, if any, which are basic to the recognition of work-related disease/illness.

2. The nature and extent and accuracy of information on health effects (of the range of chemicals used), and the degree of availability of this information to the plant medical personnel, the workers, the community physicians, as well as the availability of information concerning the plant work process to the community physicians of the types and degree of exposures to specific chemicals (or other injurious factors); all influence the recognition or lack of recognition of work-related disease or illness.

MEDICAL ASPECTS OF DETERMINING CAUSALITY (continued)

3. The absence of adequate industrial medical and environmental services in small plants for the supervision of employees' health, influences significantly the lack of recognition of work-related disease/illness.

4. The extent of governmental (city, state, federal) interest, concern and effort toward the development of industry awareness of health hazards and the responsibility for health protection, influences the range of recognition of work-related disease/illness.

5. The long-term lack of recognition by industry of the increasingly complex technical nature of the industrial work environment and the lack of realization that the most highly qualified physicians, medical resources, facilities, and remuneration are necessary, serve to undermine the foundation of medical surveillance and, therefore, of adequate medical recognition of work-related disease/illness.

6. The relative lack of histological and other biological and chemical markers (identification) in human tissues, blood and urine, for the thousands of chemicals (individually and in combination) used in industry, compound the difficulties of the medical diagnosis and recognition of work-related disease/illness.

7. The lack of environmental monitoring for toxic dusts, fumes, mists, gases and other agents in the work environment, and the absence of the necessary data on concentration levels of the various air contaminants, makes extremely difficult the correlation of health effects with work exposure, and therefore lessens the recognition of work-related diseases/illness.

MEDICAL ASPECTS OF DETERMINING CAUSALITY (continued)

8. The weakness, limitations of coverage of the compensation laws, the penalty requirements of time limitations for filing a claim, or for prior dust exposure in a specific time period, and lack of provision for delayed effects, and requirements for total disability before compensation consideration, all contribute to lessen the medical recognition of work-related disease/illness.

9. Industrial epidemiological studies, which constitute the statistical basis in the development of medical evidence for work-related disease/illness, vary considerably in the degree of thoroughness and objectivity depending upon the climate of the times; the extent and quality of cooperation from individuals, physicians, industry and official agencies; the nature, scope, accuracy and availability of the necessary data; the constraints and degree of support provided; the levels of technical information and resources available to labor and management; and finally, the underlying and, sometimes, prevailing socio-economic equation -- the concern by the companies involved in terms of workmen's compensation, legal liability, cost of control measures, labor/management relations and ultimately, community responsibility.

ILLUSTRATIVE MEDICAL PROBLEMS

In the consideration of the illustrative medical problems, descriptions of the symptoms and the disease will be omitted, except where necessary to illustrate a particular point.

BERYLLIUM

"Beryllium is an extremely toxic element". Evaluation of the recognition of the range of health effects and the influences which inhibited their recognition provide some lessons in the problems of medical diagnosis and compensation.

The beryllium industry was new. The first human experiences related to acute effects among large numbers of workers of dermatitis, tracheobronchitis and pneumonitis; several died. There was considerable concern by the companies relative to costs of control measures, and subsequently, for the liability from work-related illness, as well as from effects in the surrounding community.

The attitude of the various beryllium companies was markedly different toward the health problems which in turn determined the nature and scope of the medical programs provided at each facility.

In one plant there was full-time medical coverage with expert consultants and continuous observations of the employees, and the instigation of a series of improvements in medical examinations and surveillance. This resulted in the recording of medical observations on health effects of a large number of employees.

Illustrative Medical Problems (Continued)

(Beryllium -- continued)

In another plant, only a part-time physician was used in the early years for two hours a week, and the principal reliance for the determination of health effects fell to the industrial nurse. In this instance, the judgment about illness or symptoms that were or were not recorded, was primarily made by the nurse, who in turn reflected the extent of her experience, training and knowledge of the hazards of the work environment that was made available to her. Involved too, of course, at every plant, is a whole series of factors relative to the encouragement or lack of encouragement in the recording of work-related illnesses which in turn involve compensation. So, in essence, the industrial nurse carried the major responsibility for recognition of work-related illness in this plant and this is true for all small plants and probably extends to the larger plants.

The implication of this illustration relative to compensation is that the worker is dependent upon what was not recognized or recorded at the plant; that such records are the initial basis of compensation claims; and if the industrial medical programs or records are inadequate or non-existent, the worker, in effect, is placed in an extremely difficult, if not impossible, position.

Further, the absence of adequate medical recognition and accurate records then makes it difficult, subsequently, for the compensation investigator to obtain what is pertinent to a compensation claim. Now, the fact that records may be kept is not the answer by itself, if they do not properly fulfill the purpose. It is how accurate, adequate, and objective the records are and whether the persons completing these records have been properly

Illustrative Medical Problems (Continued)
 (Beryllium -- continued)

trained and oriented to properly recognize and record the pertinent data, that is important. Unfortunately, some records can be misleading or incomplete relative to vital points in cases of compensation and liability.

I would like now to return to the next stage of recognition of beryllium disease to illustrate some other points.

The chronic form of beryllium disease, which is ultimately severely disabling, was first recognized among patients who have been placed in a tuberculosis sanitarium, who did not respond to T.B. treatment. A group of these cases was identified as former employees of a fluorescent lamp plant where beryllium phosphors were used. This brought about the medical association of prior specific employment exposure with a specific disease syndrome, and in this manner the chronic form of the work-related disease was established. These compensation claims were vigorously denied initially -- and finally, after a prolonged struggle with extensive medical persistence, compensation was awarded. (The total inadequacy of percentage of small prevailing salary as an award for such a prolonged disabling disease has been cited by Stoeckle.¹⁵) This medical observation alerted the beryllium industry and the doctors who, in turn, found the chronic form of beryllium disease in other workers.

Further, the same beryllium disease was diagnosed among other members of the same household, due to beryllium brought home on the work clothes... a high concentration was measured in the home laundry process as well.

The point being made is the frequent misdiagnosis of a work-related disease or illness by the doctor, because of a

Illustrative Medical Problems (Continued)

(Beryllium -- continued)

combination of circumstances. In my own studies relative to beryllium workers I observed a series of such cases which will be mentioned to illustrate the point in different ways.

The death certificate of one worker, cited the cause of death as tuberculosis. In following up the particular case, it was found that the worker had died in the train enroute to Arizona and, evidently, the physician who signed the death certificate learned from an accompanying relative that the young man had been in a T.B. sanitarium. That served as the only clue to the doctor, that was all the information he had. This illustrates the problem, when individuals move from one place to another and the doctors are unaware of the prior medical findings or of prior beryllium exposure, they are in a very difficult position.

However, in this case in the reconstruction of the medical history, it was further revealed that the physician at the worker's initial residence diagnosed the case as "rheumatic heart condition but not typical case", and he was sent to the T.B. sanitarium to rule out tuberculosis, which was negative. A tentative diagnosis of Ayerza's disease was made. Later he was sent to a clinic where a further tentative diagnosis of Boeck's sarcoid disease was made. During a period of 3 years he had continuous symptoms of dyspnea and weight loss which became worse. Finally, in community study, in which x-rays were taken, the review of the chest x-rays by a panel of experts made a diagnosis of beryllium-related disease.

Illustrative Medical Problems (Continued)
(Beryllium -- continued)

However, the misdiagnosis does not occur only in such unusual circumstances or on a train in another state, but has occurred repeatedly in cases in which there has been ample time and frequent examinations of workers who have remained in the same city.

In another case, the worker had been admitted to a tuberculosis sanitarium and was being treated as a case of tuberculosis. Subsequently, an exploratory thorotomy was done which revealed a tumor of the lung in the hilum. Then, a microscopic examination of the tissues revealed chronic interstitial pneumonitis with marked fibrosis and infiltrated anaplastic bronchogenic carcinoma. In my investigation, the original chest x-rays were then obtained and forwarded to the Beryllium Registry for review, together with all other accompanying data and the conclusion was that the chest x-rays findings and the case were consistent with beryllium disease.

That case illustrates that only after the operation in which tissue of the lung was obtained, and only because of the microscopic examination of the tissue, was it then recognized that some other disease was present. Further, when the reconsideration of the x-rays and findings was brought about years later by the epidemiologist, not the original physician, then the recognition of a work-related illness was made.

In essence, expert consultation years later can bring about the identification of a work-related illness that had not been recognized by the worker, his family, or the doctor. Yet all

Illustrative Medical Problems (Continued)
(Beryllium -- continued)

prior bills had been paid by the worker, in addition to his illness.

The case illustrates further the distinct importance and advantage of the Beryllium Registry, a medical center where specialists studying a specific disease in all of its manifestations provides the necessary consultation to the physicians throughout the country.

The other point that this and similar cases illustrate, is that the eventual recognition of the work-related disease may occur many years later, long past the time limitation for filing a claim or meeting time schedule of when last exposed in the plant.

For example, in other cases of affected beryllium workers, the diagnosis was recognized 10, 15 and 20 years or more after the employee left the plant. But because of the compensation requirement (for example, the state of Ohio) the disability, at that time, must have been within an 8 year period following the last exposure to beryllium dust or fumes. In such cases, all definite work-related diseases -- with disability, would be automatically excluded for compensation consideration.

Yet, the fault for the absence of, and the time of, the proper medical diagnosis of beryllium disease, does not rest with the worker, nor should the worker be penalized further because his severe disease developed after 8 years, rather than conveniently within the time frame of the compensation law. That time requirement has remained many years beyond the well

Illustrative Medical Problems (Continued)
 (Beryllium -- continued)

established scientific fact that the serious effects of beryllium disease could be delayed for many years.

There is another major point which has evolved in the study of beryllium disease and that is the wide divergence between pre-existing disease as it relates to beryllium workers and what is reported on the death certificates.

^{11*}
 Table III demonstrates this point pertaining to just one beryllium plant. The table refers to a group of employees of one plant, who had known beryllium disease as established by the Beryllium Registry, and what the death certificate showed as cause of death. Of the 43 deaths which were in the Beryllium Registry for this group, beryllium disease was not recorded for 32 (74%) on the death certificate. If one assumes the same relative percentage (74%) of beryllium disease not reported on the death certificate, to be applied to other deaths of beryllium workers which have undoubtedly occurred and not been reported to the Beryllium Registry, nor recognized by the physician in attendance at death, then the under-reporting of beryllium disease on the death certificates is substantial.

The implication for compensation is also substantial. You will note the assignment to different causes of death for these cases of beryllium disease.

For any beryllium worker who had beryllium disease and dies, but his death certificate shows no indication of prior beryllium disease as the cause of death, then a death benefit claim by the family relative to beryllium disease as a contributing

Illustrative Medical Problems (Continued)

(Beryllium -- continued)

cause, not only begins with a severe handicap where the death certificate says otherwise, but the claim may never be made.

Beryllium workers who have severe disabling beryllium disease do die of coronary heart disease. There is hardly any alternative, but the basic cause in such cases is the overriding beryllium disease. This is mentioned, because too often the final coronary disease diagnosis has been used to deny the prior major work-related illness.

The study of beryllium workers also illustrates the importance of obtaining prior medical and pathology information on all cases, to supplement the causes of death as specified in the death certificate which in turn affect the medical evaluation.

One case illustrates the fortunate aspects of having an autopsy for further information and the change of diagnosis which occurs. The death certificate cause of death was pulmonary embolism. But the autopsy and medical records revealed that the patient had been admitted as a case of "chronic berylliosis" with right ventricular failure. The autopsy revealed extensive fibrosis and involment of the lungs and the chemical analysis of the tissue demonstrated elevated beryllium. The case and cor-related data reviewed by the staff of the Beryllium Registry confirmed the diagnosis of beryllium disease.

Within this context, however, it must also be recognized that individuals may have proven beryllium disease during their life span, but that the lungs at death may or may not reveal specific histological evidence of beryllium disease. Some individuals with beryllium disease have experienced with treatment

Illustrative Medical Problems (Continued)
(Beryllium -- continued)

a subsequent improvement in their chest x-rays' appearance and, evidently, in their chest pathology which may not reflect at death the specific pathological findings of prior beryllium disease. This would also be true for cases of beryllium disease where there has been no reversal of symptoms or x-ray findings. The lungs may not be specific for beryllium disease.

I should like now to return again to the evaluation of the recognition of beryllium disease. This time, to cite the change from the initial concept as a predominately lung disease which, consequently, placed that disease within the restraints of the lung disease category -- compensation regulations, the change to that of a systemic disease.

Further, I should like to mention, briefly, the very short intense exposure to beryllium, of less than an hour, or days, which can induce severe respiratory disease; that the disease does not require a long period of years of exposure. It is the concentration of the exposure and the extensive toxicity which can induce adverse health effects in short periods of time. So, in terms of compensation evaluation, the fact that the individual had been employed for a short period should not be used to detract from the justification of the claim. We had a case of beryllium disease who had only 2 months employment exposure and 20 years later, elevated beryllium was found in the lung tissue, as well as beryllium disease. The point here is that there is no uniform pattern or requirement of specified duration of exposure in evaluating the industrial chemicals and their health effects. The duration can be shorter than realized.

Illustrative Medical Problems (Continued)
(Beryllium -- continued)

The systemic effects, i.e., the organs of the body which were affected by beryllium, were derived from observations noted from animal experimental exposures and from autopsies of workers who had been previously exposed to beryllium. This recognition of systemic effects, then, led to the changing of the terminology from "chronic berylliosis" to the now favored term "beryllium disease". The point here is that the compensation evaluation of a case extends beyond the lung to any and all other organs and tissues affected; and that the symptoms would reflect the particular organ or combination of organs affected, and not of the lung alone.

The analogy to other toxic agents in the work environment is that the initial observation of certain effects confined to a single organ of the body, may later be found on further study to be more extensive. Consequently, in compensation cases, it is necessary to be aware that other effects may occur, even though at present they may not be recognized or recorded.

The last phase in the evaluation of beryllium disease is its cancer potential. This was actually recognized very early in animal experiments in which bone sarcomas were induced in rabbits exposed to beryllium containing phosphors, and lung cancer was induced in rats and monkeys. The consistent cancer induction in animals with beryllium compounds has led to concern whether the human counterpart will occur in workers.

This is mentioned to emphasize that such important information only occurs if the proper animal experiments and medical

Illustrative Medical Problems (Continued)

(Beryllium -- continued)

surveillance of the workers are conducted and the proper medical records maintained. All of which have a direct bearing on subsequent compensation considerations.

Now, there is one final point and analogy that the beryllium medical problem illustrates. Beryllium has been increasingly used very extensively, particularly in small plants where virtually no medical and environmental surveillance exists. Therefore, the difficulty of proper warning to the workers (if any is given at all) and the lack of proper medical surveillance and recognition of occupational health effects, makes compensation claims extremely unlikely. Where there is no recognition and no acknowledgement of risk -- the road to compensation for the worker is virtually impossible.

Finally, there is one other very important aspect -- the delay in the compensation process as demonstrated by beryllium disease. Briefly, in the report by Stoeckle,¹⁵ the experience of patients with beryllium disease has demonstrated not only the extensive delay in adjudicating and providing compensation, but also the inadequacy of compensation benefits for chronic diseases and the adverse effects on the patients resulting in severe financial hardships, as well as continuous mental stress. Cases are cited of adjudication requiring three years and more in which the patients had to support themselves, somehow, through friends and relatives, even though they had a chronic disabling disease. The eventual average compensation awards, when made, were \$12 to \$25 per week, which emphasize the inadequacies in actual benefits

Illustrative Medical Problems (Continued)
 (Beryllium -- continued)

based upon the average weekly wage at the time when the person was injured, many years before. The consequence of these delays in compensation proceedings is the disillusionment of the workers in the compensation process.

The analogy here is also to other chronic diseases due to the work environment and the problems of compensation process. Invariably, chronic lung disease claims are contested, even though the medical data are more than adequate, relative to the diagnosis, to establish the work relationship, because the company does not want to acknowledge the compensation liability. The worker then has the financial problem of paying for all medical and hospital costs and medical care and treatment in a "waiting out" -- "wearing out" process, while the case goes through the compensation process.

Again, these delays appear to the worker as deliberate to wear him or her down, to settle on any terms in order to avoid selling their furniture, their property, to meet the pressing creditors. In some pending cases, the medical bills have totaled \$10,000 and no compensation has been decided or coverage provided.

There is a serious need to search for improvement in the processes, the administrative procedures, and the laws to overcome the problems of delay in compensation adjudication and the financial hardship that the worker is subjected to during the process.

TABLE III

NUMBER OF DEATHS IN COHORT OF COMPANY "A" AMONG SELECTED EMPLOYEES REPORTED TO THE BERYLLIUM REGISTRY CLASSIFIED BY SOURCE OF INFORMATION AND UNDERLYING CAUSE OF DEATH.

CAUSE OF DEATH AND CODE	DEATH REPORTED BY:			BERYLLIUM DISEASE O DEATH CERTIFICATE	
	BOTH	BR*	SSA+	Yes	No
		ONLY	ONLY		
ALL CAUSES	20	9	14	11	32
ALL NEOPLASMS	3	1	2	-	6
MALIGNANT NEOPLASMS OF					
TRACHEA	2	1	1	-	4
BRONCHUS & LUNG (162-163)	2	1	1	-	4
VASCULAR LESIONS AFFECTING CNS AND					
CARDIOVASCULAR DISEASE					
(330-334 & 440-468)	8	-	6	-	14
VASCULAR LESIONS AFFECTING					
CNS (330-334)	2	-	1	-	3
DISEASES OF THE CARDIO-					
VASCULAR SYSTEM(400-468)	6	-	5	-	11
ARTERIOSCLEROTIC HEART					
DISEASE INCLUDING					
CORONARY (420)	6	-	4	-	10
DISEASES OF THE RESPIRATORY					
SYSTEM (470-527)	5	6	1	11	1
PNEUMOCONIOSIS AND PULMO-					
NARY FIBROSIS(523-525)	5	3	-	8	-
DISEASES OF THE DIGESTIVE SYSTEM					
(530-587)	-	-	1	-	1
OTHER	4	2	4		10

*BERYLLIUM REGISTRY

+SOCIAL SECURITY ADMINISTRATION

CHROMATES

This medical problem illustration will refer to some of the factors involved in the medical evaluation and recognition of an occupational disease/illness which occurs many years after work exposure. In this instance the focus of attention is on the long interval, the latent period, the number of years between initial exposure and the development of occupational cancer.

There is a certain historical background which is pertinent. At the time that the chromate manufacturing plants were established in the United States before 1900 there was no acknowledgment or recognition that any occupational cancer problem existed, or of any major work-related illness other than perforation of the nasal septum and chronic skin ulcers.

The literature cited in America referred to the German reports of some cases of lung cancer, but in general all the statements consistently emphasized that there were really no such problems in the U.S. and no major health effects. Then in the 1947-1948 period, someone noticed lung cancer cases occurring in one of the oldest chromate plants and the chromate industry with guidance from the Public Health Service, then conducted a study of death records of the major producers and reported in 1948, that the lung cancer rates for certain age groups were 25 times higher than expected.

The medical evidence, then, of the recognition of the occupational cancer was epidemiological; the clustering, the excessive number of lung cancer cases, which occurred in relatively small employee population groups of each plant, in which the statistical rate was found to be greatly in excess of that expected from a

CHROMATES (continued)

comparable adult population (not employed in the chromate industry). In essence, the observation was derived from studying a group of workers employed at the same place. When that report was issued, it tended to suggest that some particular form of chromate and not all chromate compounds, was involved. It is from this point in time that succeeding investigators addressed themselves to whether the cancer risk was associated with various forms of chromate compounds or to chromium *per se*.

This experience is cited for two reasons. First - upon the recognition in 1948 of the occupational cancer, this meant that all the prior workers at those plants had been seeded with a carcinogenic agent and didn't know it and that the number of cases - of lung cancer that developed before 1948 never filed for compensation. The second reason is that after 1948, even though a worker of a chromate plant developed lung cancer there were sufficient difficulties in compensation laws, so that compensation awards were denied on certain technicalities. Underlying all of this during the span of years is that the worker's information on occupational cancer relationship to his work was minimal.

The first basic point of this medical illustration -- is the long latent period (in years) and this is shown in Figure 1. It is evident that of the cohort of workers employed 1931-1937 at this chromate manufacturing plant, there were 41 deaths due to lung cancers and one living. The distribution by length of time from years of first employment exposure at the plant, shows that although the lung cancers can occur after a relative short

* Attached

CHROMATES (continued)

period of years, the clustering of the majority of cases occurred from 27 to 36 years later with cases occurring beyond to 42 years.

The compensation implications are readily apparent. In the first place, the compensation laws did not provide for coverage of work-related diseases which span so many years and the problem still remains. Further, for some states, there is the additional requirement, as I recall, that the worker had to be employed in that facility within 7 or 8 years from the time of disability. Since the disability can and did occur 20 or 30 years, etc., after the man left employment, he was and is automatically disqualified from obtaining compensation, even though the disease --cancer--will cause his death. Within the same context the family could not collect the death benefit.

There is adequate scientific evidence of the long latent period, not only for chromate cancer, but also for asbestos and other chemicals, for which there should be proper improvements in the compensation laws. There should not be such a long lag time between scientific recognition and evidence, and the actual change in compensation laws.

Another point is about medical evidence: In this illustration even though an occupational cancer problem may be identified, a series of sequential efforts seems inevitable by a combination of forces, to bring evidence to bear, to convey that it is only a partial cancer problem, relating to only one form of a chemical compound and that the problem doesn't extend beyond a certain worker group, etc., or that a study of workers did not reveal a high lung cancer rate.

CHROMATES (continued)

This is mentioned to illustrate the misuse of medical evidence. Any study of current employees, in an industrial plant, may not reflect or detect the medical problem, because those who are sick have left and are not working, and further, cancer in particular develops so many years later. It is the separated employees, those who left, that provide the evidence relative to cancer and they were not included in such a study.

This analogy also applies to other work-related problems. In acute and moderately delayed medical illness, the current work force may provide a clue as to what is happening. But the chances are substantial that the practice of the sick not working, and of disease occurring years later, will lessen any real probability of detection of the medical problem, and certainly lessen any ability to gauge the magnitude of the problem. This must be remembered in compensation evaluations and medical diagnoses.

A second major point relates to how the accentuation of a concept which prevailed for years, that only one form of chromate chemical was responsible for the lung cancer, influenced, delayed and prevented compensation for those exposed to chromium in other forms. Virtually, all the postulations, concerning the etiology of lung cancer during the span of 27 years centered on the hexavalent form of chromium and within that category only certain chemicals. The principal exception was the report of Mancuso and Hueper (1951) who emphasized the importance of the insoluble form of chromium (trivalent) in the development of lung cancer in which it was also concluded "that other not readily soluble chromium

CHROMATES (continued)

compounds, chromium pigments, chromium alloys, also must be considered".¹²

Recently evidence has been developed to reverse the prevailing concept that only soluble hexavalent chromium compounds were carcinogenic. Evidence has been developed from animal experiments conducted in Italy (Maltoni),⁴ that the insoluble hexavalent chromium compounds, such as those used in paint pigments for decades, were carcinogenic. Further, epidemiological data from Norway² reported that workers exposed to the insoluble chromate pigments had a higher rate of lung cancer. These reports from outside the U.S. triggered the interest of the U.S. Government (NIOSH). A study was initiated by the chromate pigment manufacturers to ascertain their experience in this country. The results of that study have not been reported as yet.

The basic question in view of these observations now has refocussed on the insoluble trivalent chromium compounds, and the extent of their carcinogenic potential. The only available study in which precise environmental data, relative to the work exposures, to both trivalent and hexavalent chromium, had been made and was still available was that of the original Mancuso & Hueper study.

A follow up epidemiological longitudinal study was done. of workers employed 1931-1937 at the plant followed to 1974 to determine the causes of death. The results of the study confirmed that workers exposed to the insoluble trivalent form of chromium did in fact have a much higher lung cancer death rate, that the insoluble (trivalent) chromium must also be considered carcinogenic.

CHROMATES (continued)

A series of tables will be shown to emphasize certain aspects of the medical evidence.

Table III^{*} demonstrates the influence of the length of the period of observation for the combined cohort (1931-1937) at less than 15 years period of observation, with a rate of 97.2. For that period there is no reflection of the true magnitude of the excess of lung cancer risk, as shown by the marked increase according to the longer years of observation.

Yet, this period 14.5 years, was the limited period of observation in the Public Health Service study of a chromite brick plant (1953). The observation by the PHS of only one lung cancer within the period of 14.5 years has been repeatedly cited in the literature as conclusive evidence that the trivalent form of chromium was not carcinogenic. This was misleading, because the period of observation was not long enough to observe the effects and the limitations of the study were not cited. (National Academy Science Review, '1974).

Table V⁵ in the recent Mancuso Study^{*}, shows the age adjusted lung cancer death rates per 100,000 by gradient of insoluble chromium exposures. The lung cancer mortality rate rises consistently with the increase in levels of exposure to insoluble (trivalent) chromium.

Table VI^{*} shows the age adjusted lung cancer death rate by gradient of soluble chromium exposures. There is a corresponding rise in death rate with the rise in level of exposure.

What this all means, is that the range of the carcinogenic potential of chromium compounds is really so much greater than previously recognized; that the number of workers who have been exposed in prior decades, who have been at an increased risk to

CHROMATES (continued)

develop lung cancer, are far greater than was ever realized. In essence, the magnitude of the potential risk among workers in different industries and occupations is entirely different than previously conceived. When the magnitude of the carcinogenic risk extends to other industries and other users, however, the compensation and liability extends significantly, and when this happens, at least based upon past experience, the acknowledgement by industry of the increased risk has been a very reluctant process.

There are certain medical aspects of this study which warrant discussion.

Table X^{*} is confined to the chemical analysis of the lungs and shows for 6 deaths due to lung cancer, the level of chromium remaining in the lungs according to the time interval since last exposure to chromium, ranging from 15 months to 16 years and 3 months. (In the control analysis, the lung showed 3.0 micrograms of chromium per 10 grams of tissue). It is readily apparent that there is an extensive deposition of chromium in the lungs retained over long periods of time which furthers its slow release and the development of lung cancer.

Table XI^{*} shows for one chromate worker -- the chemical analysis of chromium in the lung; the table demonstrates the wide variation of chromium found not only in different parts of the lung, but also within the same sub-section of the lung. The point is that one sample, and one chemical analysis is not representative of the chromium deposition in the lung. Low concentrations can be found in some parts of the lung and extremely high concentrations found in other parts of the lung. Medical diagnosis of the carcinogenic

*Attached

CHROMATES (continued)

relationship of chromium to lung cancer should not be related to any specific number or specific concentration of chromium in the lung. The concentration of chromium in the lung, when done in various sections of the lung can demonstrate prior exposure.

Further, the chemical analysis of chromium in human tissues requires a certain expertise, and the absence of chromium in lung tissue, for a particular sample, should not, in any way detract from compensation considerations.

Similarly, the histological type of lung tumors observed among chromate workers varies, and any attempt to insist on correlation with a specific histological type would be improper and misleading.

The medical evidence for the workers exposed to chromium compound is epidemiological -- based upon groups of workers. Medical evidence, however, can be developed by the clinical case reports of an association of a specific disease/illness, with prior work exposure. But -- usually, such case reports serve as the basis of furthering the study of larger numbers of workers employed in the same place. (For example, cancer of the scrotum among chimney sweeps, cancer of the bladder among aniline workers, subsequently recognized as betanaphthylamine; cancer of lung among workers with asbestosis; angio-sarcoma of the liver among vinyl chloride workers, were derived from individual cases.)

The clinical case reports, have a certain uniqueness and importance of their own, although limitations relative to what conclusions can be drawn are apparent. The evaluation in terms of evidence, would be the number of cases observed of a particular

CHROMATES (continued)

disease, as it relates to the number of workers exposed in a particular department or occupation. This is clinical epidemiology.

It is important to remember, too, that the case reports may very well precede in time any scientific investigation. Where the particular disease happens to be a rare type -- such as angio-sarcoma, etc., evidence is enough without an industry wide study.

Now, to return to the lessons of the chromate study and the bearing on compensation. In that study of one plant, in which 41 lung cancers were observed -- out of 173 deaths, 6.8 or 7 lung cancers were expected, based on the U.S. rates in comparable ages. There were 37 excess lung cancer (83% of the lung cases) directly due to the work exposure. (The socio-economic impact must be considered from the size of the original work groups of 332 and the present number of deaths 173). If the pattern of causes of death follows that already observed for over 50% of the deaths of that worker group, then the excess number of lung cancers will be proportionately that much higher.

The conclusion is that the size of the contribution of occupational cancer for a specific worker population may be far greater than is presently recognized and that the socio-economic consequences, the losses, are that much greater. What is already apparent, and will be emphasized and appreciated even further, when other lung cancers develop, is that the prevention of 83% of the lung cancers -- that occurred in that small work force could have been prevented by control of the chemical work processes. Further, at this stage, we have yet to study other causes of death, which directly or

CHROMATES (continued)

indirectly may be related to the chromate plant work exposures. I believe that other respiratory diseases are related as well as cancer of the nasal sinuses. Eventually, further statistical analysis of these causes of death may reveal that the proportion of deaths from all work related causes is even much greater than currently recognized.

If one should attempt, in retrospect, to apply this experience of a typical chromate plant to other plants (which were older and perhaps, had higher concentrations of exposure) as well as to users and assumed that, at least, a similar excess in lung cancer and other causes of death had occurred during the past decades, then even for these plants and populations, the economic loss in compensation for disease not recognized since the development of that industry and those chemical products, must be very great indeed.

The point is the recognition of serious work related diseases now may provide the basis for future action and compensation consideration but in no way does it provide any means to recover health damages or compensation for all those individuals in the years past who had been affected and never knew either the cause or had any hope to receive compensation. In retrospect, even if the disease had been recognized during those decades the amounts of compensation in terms of previous wages, and even for death benefits, put a small price on the value of human life.

I believe the past must be remembered, and those who have suffered and died due to work-related diseases must be remembered and their families must not be penalized because neither the

CHROMATES (continued)

industry, the government or anyone else ever conducted the necessary studies to bring recognition to the work-related illness. It would be appropriate that consideration be given to develop some means for workers and their families to receive compensation and other benefits for damages done to their health, when scientific studies conducted years later, do determine that these workers did in fact sustain a work-related disease.

If this possibility of liability existed, then, appropriate attention would be given to adequate records, adequate environmental air monitoring and adequate medical surveillance, in order to avoid such future liability, even if pro-rated or applied to a common fund. An initial step is to allow for the filing of a compensation claim, for work-related cancers without a specified time limitation.

FIGURE 1
LATENT PERIOD FOR 1931-1937 COHORT OF NEW EMPLOYEES
IN PLANT MANUFACTURING CHROMATES

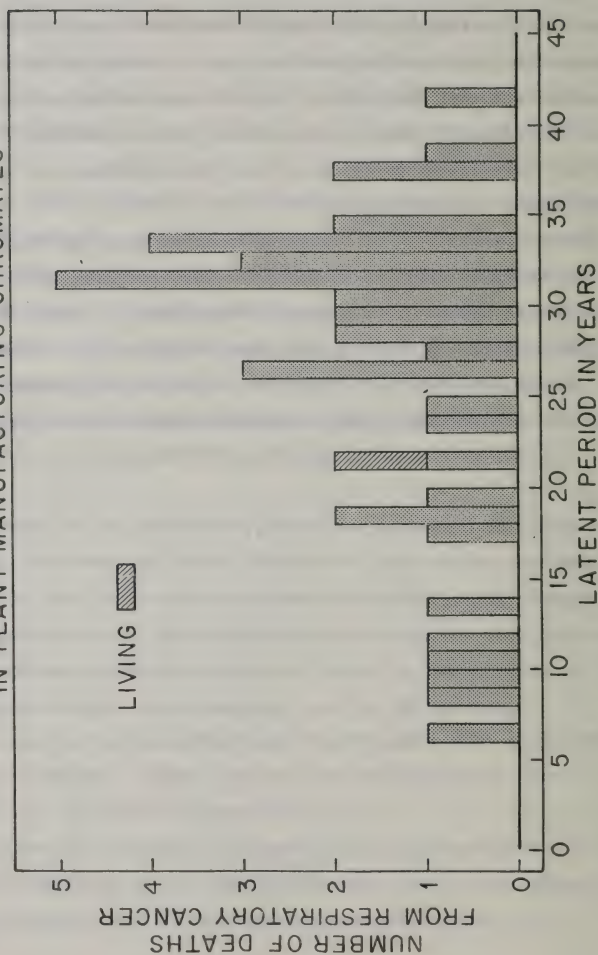


TABLE III

AGE ADJUSTED MORTALITY RATES* FOR CANCER OF THE LUNG FOR EMPLOYEES
IN A CHROMATE PLANT FOLLOWED ACCORDING TO DESIGNATED YEARS OF OBSERVATION
FOR WORKERS EMPLOYED 5 YEARS OR MORE.

YEARS OF OBSERVATION	COHORT 1931-1937	
	No.	RATE
< 15	6	97.2
< 21	10	161.9
< 27	13	210.5
< 29	16	259.1
< 31	20	323.8
< 33	27	437.2
< 36	34	550.5

* PER 100,000

TABLE V

AGE ADJUSTED LUNG CANCER DEATH RATES/100,000 BY INSOLUBLE CHROMIUM EXPOSURES --
MG/M³— YEARS.

INSOLUBLE MG/M ³ — Yrs.	PERSON YEARS AT RISK	NUMBER OF DEATHS	AGE ADJUSTED DEATH RATE
<0.25	1,399	0	0.0
0.25-0.49	1,499	2	144.6
0.50-0.99	1,708	3	174.6
1.00-1.99	2,039	7	327.9
2.00-3.99	2,409	15	630.7
≥4.00	2,037	14	649.6
TOTAL CHROMIUM	11,091	41	369.7

TABLE VI

AGE ADJUSTED LUNG CANCER DEATH RATES/100,000 BY SOLUBLE CHROMIUM EXPOSURES --
 MG/M³-YEARS.

<u>SOLUBLE MG/M³--YRS.</u>	<u>PERSON YEARS AT RISK</u>	<u>NUMBER OF DEATHS</u>	<u>AGE ADJUSTED DEATH RATES</u>
<0.25	3,612	3	80.2
0.25-0.49	1,690	5	306.0
0.50-0.99	2,206	10	441.5
1.00-1.99	2,358	11	462.2
≥2.00	1,225	12	998.7
TOTAL CHROMIUM	11,091	41	369.7

TABLE X

CHEMICAL ANALYSIS BY INTERVAL SINCE LAST EXPOSURE TO CHROMIUM

INTERVAL SINCE LAST EXPOSURE	<u>CASE NO. 1</u>	<u>CASE NO. 2</u>	<u>CASE NO. 3</u>	<u>CASE NO. 4</u>	<u>CASE NO. 5</u>	<u>CASE NO. 6</u>
	15 Mos.	3 Yrs, 5 Mos.	8 Yrs, 9 Mos.	10 Yrs.	14 Yrs.	16 Yrs, 3 Mos.
LUNG (PNEUMONECTOMY AND BIOPSY)					LUNG W/TUMOR	
					429.0	337.0
					514.0	227.0
					117.0	
RIGHT LUNG	156.0		1575.0	78.7		11.7
	155.0		975.0			46.9
						68.5
LEFT LUNG						114.0
			0.94			21.4
	312.0	330.0	450.0		63.2	39.1
	330.0	380.0	250.0		4.1	57.2
WITH TUMOR		456.0	625.0			141.0
		26.0				
BRONCHUS			1450.0			

VARIATION IN CHROMIUM DEPOSITION IN THE LUNG
MICROGRAM CHROMIUM PER 10 GRAM TISSUE

SECTION A OF LUNG	SECTION B OF LUNG	SECTION C OF LUNG	SECTION D OF LUNG
200 $\pm$ 1.5	118 $\pm$ 6.0	409 $\pm$ 3.0	302 $\pm$ 6.0
160 $\pm$ 3.0	100 $\pm$ 3.0	208 $\pm$ 6.0	144 $\pm$ 3.0
87.4 $\pm$ 1.5	92 $\pm$ 1.5	182 $\pm$ 1.5	212 $\pm$ 3.0
100 $\pm$ 1.5	185 $\pm$ 1.5	293 $\pm$ 1.5	160 $\pm$ 3.0
374 $\pm$ 6.0	288 $\pm$ 3.0		
LUNG WITH TUMOR	LUNG WITH TUMOR		
119 $\pm$ 1.5	142 $\pm$ 3.0		
DURATION OF EMPLOYMENT	25.4 YEARS		
EXPOSURE YEARS OF CHROMIUM PER CUBIC METER			
INSOLUBLE	4.32		
SOLUBLE	2.33		
TOTAL CHROMIUM	6.65		

Illustrative Medical Problems (Continued)

MULTIPLE EXPOSURES

In terms of background what must be more properly recognized is:

- 1) the use of several hundred thousand trade-name products in industry, each one of which may contain two, three, four or more chemical components;
- 2) that no system really exist to identify the toxicity of these chemical components and
- 3) that such information is necessary and basic to the doctor in his differential evaluation whether an illness is work-related or not and certainly is essential to the worker as pertinent information to protect himself to know whether he has a work-related illness and, finally, the basis of any hope for the proper filing of a compensation claim.

There is no legal requirement that the chemical components of various trade-name products nor the various toxic effects be made available to NIOSH or OSHA or any other agency concerned with the protection of the industrial population nor is there any legal requirement for the proper testing of the chemicals before they are introduced into the work place.

Yet, the doctor in practice, if he is to make a medical diagnosis, needs information about the work environment and the specific work exposures, the specific chemicals to which his worker patient was exposed prior to the illness. Basically, this lack of information constitutes the fundamental obstacle to the recognition of causality, and appropriate steps and approaches must be evolved to overcome this fundamental problem.

Illustrative Medical Problems (Continued)

(Multiple Exposures - Continued)

The problem has been an accumulative one getting progressively larger as more and more trade-name products are utilized and changed each year. Unfortunately, the recognition by the worker that the trade-name product may be harmful is when he and other workers get sick. This is a common occurrence. A few brief examples are as follows:

A machinist developed a lung condition and requested information from the company to give to the doctor. But the company wrote back that they didn't have to give that information. In this case, neither the worker nor the doctor could get the information and both needed the information for diagnosis. It so happened by recourse to a consultant outside the state, the chemical components of the trade-name product were identified. Three of the four chemicals had highly toxic effects on the respiratory system. Without that information, both the doctor and the worker were at a complete loss for diagnosis or compensation considerations.

Another case illustrates some other points. A machinist using a new solvent noticed "some peculiar symptoms in addition to the rash seven men got lightheaded then got sleepy feeling and so forth" the shop union steward was concerned because of the symptoms around the machinery and filed a grievance. The solvent was changed and the symptoms disappeared.

The points illustrated in this case are: 1) that the company really did not know the toxic effects to the chemical it was using; 2) salesmen often play down the harmful effects

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

of trade-name products and the toxicity of the chemicals which make up the product and they play down the need for specific expensive control measures; 3) when management is misled, both the company and the workers can end up paying a heavy price; 4) we were unable to obtain any information on the chemical composition to this trade product from NIOSH because that information was not provided by the company.

Yet, here was a definite health risk about a specific trade-name product in which no identity as to the specific chemical cause could be made that would have been most helpful, medically, to the doctors who saw those workers and others using this product elsewhere.

In this case, and the analogy applies to other trade-name products, a direct association for compensation can be established of exposure to a specific product because of the resulting effects from that exposure, even if the specific chemicals are not known. However, in compensation claims, repeatedly, the burden falls to the worker and he is requested to identify what chemicals really caused his problem. Just the naming of a trade-name product has not been sufficient.

Compensation cases, unfortunately, are routinely contested and the deciding factor frequently is the identification of the chemicals within the trade-name product and then the submission of toxicological data about these chemicals. Again, too, the doctors in making their diagnosis would want to be more secure in their observations and determinations of the case by knowing

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

the specific chemicals involved. Only in this way can they correlate the symptoms observed of their worker patient to the toxic effects reported about these chemicals used in the work place. Further, such correlations then make possible the inclusion in the medical literature for a subsequent referral by other physicians faced with similar medical problems.

In this instance and, probably, in a large number of plants, the companies really do not know the toxic nature of the chemicals they are purchasing. They know the quantity used, but they have not concerned themselves with the toxicity. Consequently, when they do not know, they can neither properly inform the worker nor establish the proper control measures. Because of this, frequently, it is a worker who makes the first observation on health effects of what is happening on the job.

So, some national mechanism ^{or} /system must be developed to help not only the worker and the doctor, but also the companies that need further information from an "outside" source, information that can be relied upon, that is accurate and complete.

Unfortunately, the converse also occurs and is more frequent that the company does know the harmful effects of the chemicals purchased. The reality of the situation from past experience is that time and time again the company has stated to the worker that a particular solvent problem is not harmful, is "safe", or has misled the worker on the information provided relative to toxic effects of the components of the trade-name products. At present, the workers have no recourse to any real method to resolve this problem. (There is no way for the present hazard evaluation procedure to meet the needs of the many hun-

Illustrative Medical Problems (Continued)
 (Multiple Exposures - continued)

dreds of thousands of work places and this is no solution for trade-name products.) These problems are occurring simultaneously every day and growing. The result is that the workers are not informed either because the companies do not know or if the companies do know the proper information is not provided. Such is the combined national dilemma of the worker and the doctor. The necessary data to assist in the recognition of work-related disease are either not available or very difficult to obtain.

In general, most companies know the chemical components, because it is their chemical specifications that are required in the trade-name product, they have to know what chemicals will work for their particular process.

In the consideration of the work exposure a worker may be exposed to several trade-name products, each of which contains several different chemicals which may be toxic. Consequently, when two trade-name solvents are used the work exposure then is not just two chemicals, but rather of four or eight different chemicals in various compositions in these solvents. Further, the work exposure invariably is not confined to the solvents (which are mixtures of chemicals), because the process may require application and exposure to other chemicals such as sealants, which in turn contain three to six chemicals and within each sealant two or three chemicals may be known to be toxic.

The labeling of chemical solvents most often provides no real clue to the worker. In the labeling of drums of chemicals

Illustrative Medical Problems (Continued)
(Multiple Exposures - continued)

used, industry abides by certain regulations which I don't think adequately indicate the subsequent danger. Here you have a multiple problem. First, the labeling may not adequately warn the worker, so that he doesn't know. And the second problem is that the label may not list all the toxic chemicals which are in the particular drum -- because very frequently, as in the case of solvents, they will contain a mixture. Toluene may have a small percentage of benzol in it; benzol can produce leukemia and aplastic anemia..., the benzol may not be identified. The third problem is that in the industrial application, as they draw the chemicals away from this drum for use inside the plant, they move it and use it in smaller containers which do not have any label on them at all. So the worker ends up using the particular chemical, even without the warning label and not knowing the chemical exposure.

A few other illustrations may help. Paint strippers which are commonly used consist of three or four chemicals. One paint stripper, for example, contains methylene chloride, ethyl acetate, butyl cellosolve and ammonia; all of which have their own toxic properties. One paint primer contained methyl ethyl ketone, toluene, isopropyl alcohol, butyl alcohol, butyl acetate, and cyclohexanone. The toxic effects must be considered in terms of each component.

Another illustration is "paints" such as spray painting of airplanes. The term "paint" to the doctor does not carry with it the knowledge of its components or of their effects. For example,

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

one paint included the following: Methyl ethyl Ketone, cyclohexanone, cellosolve acetate, xylene, butyl acetate, Methyl iso butyl Ketone. Polyurethane paints, further, contain toluene diisocyanate. Other paints are epoxy resin which contain toxic chemicals. Further, paints contain a number of thinners which may cause harmful effects, and one of these is ethylene dichloride. It is readily apparent that paints and their thinners include a wide range of toxic chemicals.

The point of these illustrations is to demonstrate that, basically, in the description of the work environment the doctor needs more than a general term, or "title" of the material used or a classification of toxicity. To properly evaluate the potential range of the toxic effects he must know the chemicals that are involved.

For the medical evaluation by the doctor when the worker is exposed to multiple chemicals, the worker can have a group of symptoms that are definitely the result of such work exposure. But these symptoms are not readily recognizable, because of the mixture of symptoms contributed by each chemical, affecting the same and different organs of the body, to different degrees. Further, certain symptoms may be more pronounced because in a mixture of chemicals and "additive effect" may occur in which the toxic combined effects of both chemicals may be greater than the effects of either chemical alone, particularly, if more than one chemical affects the same organ of the body.

Although predominant symptoms may occur because of the percentage of a particular chemical in a product, or because of

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

the duration of exposure to that particular product, nevertheless, excess exposures can occur to mixtures of chemicals without any readily recognizable clinical syndrome.

This is mentioned because only too often in the investigation of a compensation case the search is for clear-cut classical symptoms and the search for one predominant chemical. This may occur, but most often there are symptoms not that clear at all.

In brief, multiple symptoms, each from different chemicals, acting on the body at the same time can confuse not only the worker, but the doctor who is trying to make a diagnosis as well as the investigator.

In terms of work exposure, trade-name products refer to only one aspect of the work exposure. There is a large number of other chemicals and material used in the plant whose identity is not hidden by a trade-name product label. Again, the company knows precisely what chemicals and what materials are being used and for what industrial purpose. This information is necessary for the doctor to consider the effects of these substances and the cumulative effects, but the physician needs not only the information relative to the series of exposures that his patient has been directly exposed to, but also to know about other work exposures around him. In essence, the worker patient has not only his own hazard of multiple exposures by the nature of his own work, but he is also exposed to toxic fumes, vapors, gases, etc. from the workers all around him, all doing their own particular work. The work is going on simultaneously from different

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

processes with the fumes from each job carried to the adjoining work areas, and potentially adding to the toxic exposure of the adjoining area.

Within that frame work, too, in the investigation of the work environment relative to work-related illness it must be recognized that the investigation of the work environment, many months after illness developed or years after the chemical exposures occurred may not represent the original prevailing work condition. This has happened, time and time again. This is mentioned because the medical evaluation and correlation with the work exposure should relate to the time period prior to the illness and not to the situation which has changed since the illness. It is necessary to determine whether there have been any changes in the work processes; whether other chemicals were substituted after the problem was identified; whether there have been changes in the volume of production or of materials handled; whether ventilation or other control measures were installed subsequent to the illness, etc. Finally, in multiple chemical exposures the air sampling must be done for each of the chemicals in order to determine the air concentration level of exposure and not just for one chemical.

I should like now to refer to the problem of interpretation of the commonly used term "occupational exposure" and to indicate how this bears on the medical diagnosis in compensation considerations.

The term "occupational" has several connotations and can be misleading in the estimation of work exposure risk. Historically,

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

at the time of development of the compensation system, the term occupation related primarily to the trades and crafts, for example, carpenter, plumber, electrician, painter, roofer, printer, butcher, laborer, shoemaker, tailor and so forth, and primarily to the occupations, in the accidental traumatic concept, related to injury.

The rapid industrialization, expansion of industry of every type and the subsequent development of the petrochemical industry, and the broad range of industries that brought about a tremendous expansion, so that one industry, like steel, could have 14,000 different job titles. There are comparable numbers, thousands of other job titles in each of the major industries. The two volumes of the dictionary of occupational titles testify to the diversity and large number of occupational titles in each type of industry.

The word occupational is also used to refer to the specific work of that individual regardless of trade and in this sense attempts to relate the individual to a specific work exposure. In this sense, occupational illness has meaning in broad terms.

However, the name of an occupation does not provide an adequate basis of estimation of risk for the doctor. There are some exceptions but in general this is true. The same name title of a specific occupation can have different job exposures not only in the same industry but in other industries as well. Although, a few simple illustrations can be given, my concern is really with the more complex situations of occupational exposures

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

to combinations of dusts, fumes, mists, gases, etc. which in no way is reflected by the name of the job but only by actually knowing what the work exposure is. The point is that no one should abstractly visualize a specific occupation as having no risk or "confined risk" to a single exposure, etc. -- as a matter of one's own limited orientation -- in contrast to actually knowing and determining the work exposure at that particular plant for that particular job at that particular time.

Further, even in the specific trades as has been noted in railroad round houses in making steam engines, etc., a dozen crafts could be working in and around that engine night and day, each exposed to all the dusts, fumes, vapors and noise, etc., and in no way could the name of the single craft occupation reflect all the exposures actually sustained in a day or accumulatively over the years. For those who know the railroad exposure this could be attempted, but to the doctor outside in practice, given the title, machinist, boiler-maker, painter, tinsmith, carpenter, electrician, etc, the visualization is to an independent operation and exposure, in different areas with confined risks.

It is the work exposure and the descriptions of the work exposure that are important, that convey the nature and extent of exposure and risk, and not the particular name of the job. Some job classifications do convey risk but my reference is to the overview of all industrial employment. One common example is the term "laborer" which is misleading. The doctor, like most others, probably thinks of the laborer in terms of heavy physical

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

work, such as construction and thus does not realize that laborers can be exposed to injurious chemicals and sustain the same harmful effect as other workers.

Actually, in many types of industry the laborer and maintenance workers and sweepers are in greater exposure to chemicals, dust, and, therefore, at greater risk. They work with the accumulation of dusts, etc., and can get massive exposures. Laborers have more problems with compensation, because even the companies do not recognize their occupational risk and air-sampling to measure the amount of various dusts, fumes and gases is usually not carried out where a laborer works.

One case, briefly, of a laborer in a chemical plant illustrates this point. The chemicals that were too toxic and dusty to be dumped into the landfills were fed into the boilers and that was his job. He mentioned a group of chemicals, called "fluorocarbon, toluene diisocyanate and methyl diisocyanate" then added "a lot of other chemicals were brought to be burned in these boilers". Well, this laborer had to clean the inside of these boilers which usually took three weeks for each one of the series, and he was exposed to the chemical residue of all these chemicals and this was repeated exposure for six to eight years.

In addition, the laborer had to clean out the precipitators packed with accumulation of dust and coal and chemicals and he would inhale all of this, while squeezed into a tight place to clean the precipitators. He developed respiratory effects

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

of bronchitis, lung fibrosis and subsequently, emphysema, for what I considered a combination or a mixed chemical dust effects. I do not believe the man ever got compensation.

The job title "packing and shipping" may mislead in estimating risk. In one case, for example, a group of women were in a packing and shipping area doing their work on a table, but this table was adjacent to a room where objectionable and toxic chemicals were being used in another process. Every time the doors were opened and stayed open, which was frequent, all the fumes came pouring out directly to the girls working on the table. When that lady went to the doctor with her symptoms, and he asked her, "what do you do", and she replied, "packing and shipping", this would tend to exclude consideration of chemical exposures as a causative factor in her illness. Yet, as happened in this plant, the same job titles mean different things in different industries. "Packing and shipping" in a chemical industry for example, are recognized as high exposure risks.

Again, the terms "occupation" or "job" may relate to one worker and not a group of workers in an industry. An occupational illness may relate to just one worker because by the nature of his/her job he/she may be more exposed for a longer period of time than someone else or because of the physical location he/she may get more of an exposure, or because he or she is the only one doing that particular job, working with that particular chemical or trade-name product.

Further, "occupation" or what one does and where and when varies at different points in time. Even with his current

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

employer a worker may move from one department process to another, but this also occurs with the previous and succeeding employers. In essence, the work exposure and the type and the extent of exposure may be different with each job change in the same facilities and in a sequence of employment, covering a number of years.

For the doctor the point is that the "occupation" or what one does and has been exposed to, varies all the time and the last or present "occupation" may have no bearing at all on the medical problem, but rather is related to what work the men did months or years before. Similarly, in the case of deaths what is recorded on the death certificate as his type of work or occupation, or even prior employment may be entirely different from work and employment carried out 5, 10, 15 or 20 years before death. Those who become sick usually change to less arduous jobs, and when they die, the last occupation, employer or type of industry, may be specified on the death certificate by the informant.

For the doctor, then, in his medical evaluation, it is the long-term work history information, the nature and scope of exposure, and the degree of exposure that is helpful. Employees can move from one occupational risk to another within the same plant at different points in time, and individuals that have minimum exposure now may have had extensive exposure before. Further, there can be low and high exposures of certain chemicals in the same department.

So, what the doctor needs and compensation authorities need, and what the companies must develop and provide, are adequate

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

records of employment, job changes, and all work exposures linked together chronologically over time.

Within the context of the tremendous numbers of occupations, job titles and multiple exposures at each place of employment and for each succeeding employer over the years, it must be realized that the use of simple questionnaires to determine the type and the magnitude of work exposure in present and past exposures to industrial dusts, fumes, mists, and gases by designation of occupation and type of work could in no way properly reflect the complexity or summation of these exposures during the course of the work life of that individual.

In response to the complexity of the work exposure, the physician's initial effort is to determine what is known and what is not known in the medical literature about the various work exposures and chemicals that he has been able to identify. This is the start of the differential diagnosis. The point I wish to emphasize is the limitations of what has and has not been reported in the medical literature and the interpretation that may occur, which can be misleading.

Basically, it must be recognized that only a fraction of the occupational illness problems that are occurring is being reported and further, that sole reliance on the literature can be technically inappropriate.

As an illustration to begin this consideration, a work exposure involving the association of trichloroethylene and subsequent liver damage is mentioned. In one situation, in one plant,

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

three cases: three women doing the same job, at the same place, using the same chemical (trichloroethylene) came down with the same liver damage, yet because the older medical literature cites liver damage as only a possibility, the validity of the claim was disputed. Even though the doctor recognized the occupational relationships, he didn't feel it necessary to report just a few cases in the literature. They didn't realize the importance of such reports. Yet, the absence of such reports then affects the next doctor with similar observations of damage to the liver in other cases exposed to the same chemical. The doctor looks again at the literature and since he doesn't see or know of these other cases which were not reported, he wonders whether he needs to report his case; as a consequence, the evaluation of the claim is made more difficult. This is going on all over the country.

Let me give you an example about one chemical which illustrates a number of principles which apply to other chemicals. In the medical and toxicological literature the description of methylene chloride (which is used extensively as a paint stripper in trade-name products) is referred to in the classification of the chemicals as "least toxic" among the chlorinated hydrocarbons. This can be misleading in many important ways. First, it misleads the doctors who were impressed with the words "least toxic" and who do not dig further to obtain the related reports. This expression "least toxic" was written a great many years ago and has been repeated and published and misinterpreted by doctors and a great many others as implying certain "safety qualities." Under no circumstances should anyone be taken in by the phrase "least toxic"

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

in reference to methylene chloride. The original comparison from which the phrase was used was against the highly toxic carbon tetrachloride. In this respect I am concerned about the possible misuse of the phrase "least toxic" in attempts to deny legitimate compensation claims of workers exposed to methylene chloride.

(At present, one of the most difficult abuses in terminology is the promotional word "safe" and "safest", as applied to other solvent chemicals on the market. The company and, therefore, the worker and eventually the doctor and compensation investigator are told this is a "safe" solvent. Precautions are not taken and the consequences can be substantial. There is no such thing as a "safe" solvent - "safe" is a relative term in toxicological considerations.)

Rather than furthering the concept as "least toxic", methylene chloride has enough serious symptoms and effects observed in animals to be taken very seriously indeed.

In recent years an additional, unexpected, and important finding has been noted that inhaled methylene chloride is converted in the body to produce significant quantities of carbon monoxide and, therefore, of carboxy hemoglobin in the blood. This can result when a worker has been given only a single inhalation exposure to a high concentration of methylene chloride.

This means that we now have to study and measure the carbon monoxide, the carboxy hemoglobin among workers exposed to methylene

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

chloride and study more carefully the long range effects which may be due to the increase in carbon monoxide in the blood which may not have been recognized. It also warns us that when workers have cardiovascular problems, they could be aggravated by the carbon monoxide in the blood which results from the inhalation and absorption of methylene chloride; in essence, the aggravation of a pre-existing condition. The high volatility of methylene chloride means further that high concentrations can build up quickly in rooms without proper ventilation.

Another important point that is illustrated is the combination effect of chemicals. When methylene chloride is used alone, as the only chemical in the particular exposure, it causes the formation of significant carbon monoxide. But when methyl alcohol is also used with methylene chloride in the same solvent mixture or trade-name product, then it has been found that this combination further increases the amount of the carbon monoxide formed in the blood beyond that of methylene chloride alone, and further, that the carbon monoxide remains longer in the blood.

There is still another point that the methylene chloride example illustrates and that is the difference of toxic effects that occur when a person is sitting or working under exertion during the exposure to the particular chemical. With heavy exertion the amount of methylene chloride taken into the body will be much greater and the risk to the cardiovascular system

Illustrative Medical Problems (Continued)

(Multiple Exposures - continued)

greater. So, in any evaluation as to how the exposure occurred, physical exertion and, also, the presence of heat, which is also a factor, should be considered.

Further, absorption of a solvent through the skin can increase the toxic exposure of the worker beyond the limits specified in the standards. So, it is important in the evaluation to note the possibility of absorption of chemicals through the skin. Even when the air concentration of a chemical like methyl-ene chloride may be below the level in the standard, the amount absorbed through the skin may be sufficient to raise the toxic exposures beyond the so-called safe limits. This, of course, applies to other chemicals as well.

I should like to refer to another chemical and group of chemicals, ketones, to illustrate the limitations for the doctor in the interpretation of the literature on toxic subjects.

Methyl ethyl Ketone is used extensively. The important point about this chemical is the absence of adequate medical studies on the long-term health effects of the workers exposed, and its close relation to Methyl butyl Ketone which has been demonstrated to cause severe neurological effects.

The medical reports on Methyl ethyl Ketone are relatively few, and go back a great many years and are limited in their scope. The unfortunate part about all of this, and this is true for many solvents, is that the doctors and compensation evaluators have only this limited information to rely upon. We really do not know the true magnitude of the toxicological effects of

Illustrative Medical Problems (Continued)

(Multiple Exposures - Continued)

Methyl ethyl Ketone. I strongly suspect that the effects are much greater than is realized at present.

Methyl isobutyl Ketone also extensively used is chemically different from Methyl ethyl Ketone and Methyl butyl Ketone. This chemical is mentioned because it is also closely related to the chemical Methyl butyl Ketone, which has been associated with extensive damage to the nervous system.

Methyl butyl Ketone solvent attacks the nerves of the muscles, causing an extensive weakness of hands, arms, and legs and so severely affects the workers that they are disabled and have no strength to walk or to use their arms and hands. It is important to know that this chemical, Methyl butyl Ketone was previously not recognized to have any of these effects. It is also possible that such effects may result from a combination effect of Methyl butyl Ketone with other chemicals.

Theoretically, in my opinion, if the concentrations of exposure to Methyl ethyl Ketone are high enough, then the damaging effects on the nervous system that have been demonstrated with Methyl butyl Ketone will also occur with Methyl ethyl Ketone and Methyl isobutyl Ketone. (I believe that the damage to the nervous system, the peripheral neuropathy induced by Methyl butyl Ketone is a sufficient warning that extensive medical studies of workers exposed to related chemicals such as Methyl ethyl Ketone and Methyl isobutyl Ketone should be undertaken.)

The tragic lesson learned is that chemicals which may be considered at present to be limited in their harmful effects

ADJUNCTIVE MEDICAL PROBLEMS (CONTINUED)

(Multiple Exposures - continued)

may, in effect, have greater and more substantial effects than has been ever realized. If the worker develops the illness and symptoms from the job exposures and he has the illness, it doesn't make any difference how negative any animal experiments have been before. The human evidence is the final evidence and, unfortunately, sometimes, it is too final in its effects.

The essence of all this discussion on multiple exposures is that there is no simplistic approach to the determination of and the evaluation of work exposure and work related health effects.

INDUSTRIAL CANCERS

The belief which has been frequently stated in the past, that occupational cancer is a minor problem, is false in concept and in fact. There has been, virtually, a complete scientific vacuum during the past decades relative to the study of the carcinogenic potential of the many thousands of chemicals, individually and in combination, introduced into the work environment. In the absence of these studies, assumptions have been made which have precluded and discouraged extensive investigations of occupational cancer. There has never been a national concerted study of occupational cancer in this country.

This has been most unfortunate. Only now are we beginning to uncover some of the occupational cancer problems which have existed, but were not recognized. The magnitude of the population potentially at risk has yet to be determined. The most recent observations with asbestos, vinyl chloride and arsenic are only a few illustrations. As each industry is studied, the chain effect of potential risk with other industries, occupations and the community unfolds. No one really knows the carcinogenic potential of the complex occupational environment in the United States.

The carcinogenic potential of industrial exposures is reflected in the reports of carcinogenic effect, for example, from just one single dose of dimethylnitrosamine by injection and by inhalation.³ Further, the observation by Saffiotti¹⁴ that the carcinogenic potential of diethylnitrosamine could be con-

INDUSTRIAL CANCERS (continued)

siderably enhanced in the production of lung tumors from 5 percent to 70 percent when the hamsters were also subjected to ferric oxide (which alone did not cause cancer), indicates that various chemical combinations of exposure in the working environment may have a greater carcinogenic potential than has been recognized. In other experimental studies, similar effects have been observed of cancer effects from a combination of industrial chemical exposure, that was not detected from the one chemical alone.

This comparatively recent developing observation of the cancer effect from the combination of industrial chemicals has brought about the unsettling recognition that, virtually, all prior testing of industrial chemicals when they were done (decades before) were primarily as a single chemical rather than in combinations of chemicals used in the work environment. The scientific unknowns, therefore, span the carcinogenic potential of many thousands of chemicals that were used and are in use, because of the total absence of experimental studies on the combination of these thousands of chemicals with each other, and with the chemicals evolved in their interaction, in the work environment.

The national concern is compounded by the realization that in prior years, the testing of the industrial chemicals for toxicity and carcinogenicity, which is the basis of our present understanding, was invariably short-term laboratory experiments, and the primary exposure was by ingestion or injection in experiments, rather than by inhalation exposure which is the particular means of exposure to the worker. Further, the chemicals

INDUSTRIAL CANCERS (continued)

tested in animal experiments were at room temperature, yet when these chemicals are used in industry, they may be subjected to heat and may change their composition or unite with other chemicals in the work atmosphere to form new chemicals whose carcinogenic and toxicological potential have not been identified.

In terms of toxicity there are a few examples to illustrate the change that occurs when the industrial chemicals are subjected to heat in the work environment. In the rubber industry, chemicals subjected to heat in conjunction with other factors volatilized and became highly toxic.¹⁹ A number of deaths and several hundred cases of respiratory illness among rubber workers occurred when a chemical compound considered to be non-toxic by laboratory experiments was subjected to heat during the actual manufacturing process and exhibited marked toxicological properties.²⁰

It has also been observed that a compound used in the rubber industry when subjected to heat would volatilize and liberate a known carcinogen.

Recently a series of experiments have established some remarkable demonstrations of the necessity of studying industrial chemicals and materials subjected to heat.^{13 18} Petajon et al reported upon the extreme toxicity from the combustion products of a fire-retarded polyurethane foam. The highly toxic chemical in the combustion products was identified, and found to be in the order of six times greater than a chemical warfare agent or parathion, an insecticide, both of which are, of course, extremely toxic. These studies have extended the range of the scientific

INDUSTRIAL CANCERS (continued)

unknowns of toxicity and carcinogenicity relative to the industrial chemicals.

I should like now to refer to some of the factors that are considered in the medical evaluation, some of the principle factors that have been raised, as they relate to compensation.

(1) Exposure to environmental carcinogens need not be continuous to be effective, with the cancers appearing many years after exposure has ceased. The carcinogenic potency of a particular agent is not uniform for all tissues but may vary considerably. Carcinogens may produce cancer at distant organs from the site of contacts, example betanaphthylamine -- developing cancer of the bladder following inhalation or absorption of the chemical through the skin.

(2) The reasons for the different behavior of the various carcinogens are uncertain. They may be related to the physical status at which a particular carcinogen exists at the time of exposure, i.e., whether it is a dust, fume, mist, vapor or gas as well as the dominant particle size and the stability of its physical form and its chemical properties, the metabolism, excretion and deposition, as well as type of contact, skin exposure, inhalation or ingestion.

(3) Animal experimental screening, although very effective, cannot give complete assurance following negative findings that the same chemicals will not give positive results in humans, exposed under operating conditions in the working environment.

(4) The lack of histological or biological markers of cancer of specific organs such as the respiratory system due to a variety

INDUSTRIAL CANCERS (continued)

of environmental agents or other causes, has made it difficult to differentiate occupational cancer from cancer from other causes. Histologically, the same histological type of tumor may occur for the same organ regardless of the etiological agent and further the histological type may vary in the same organ among different workers, even when caused by the same carcinogenic agent.

(5) Exposure conditions appear to control, to a large extent the sex, color and nativity relative risk of environmental cancers. Whenever both sexes are equally exposed to a particular carcinogenic agent, there is a tendency towards equalization of the sex incidence of cancer involving a certain site. In some industries, because of the nature of the work, women are selectively placed in certain job exposures. If the cancer exposure is there, then they will be the ones affected. Occupation, rather than sex, selects those affected. Similarly, the employment placement of the black or foreign born in adverse work environments remains the principle factor of carcinogenic exposure rather than color or nativity per se. (Exception is skin cancer).

(6) Host response -- the problem of the marked individual variations in susceptibility and resistance to carcinogenic agents, which is concerned with host factors, inherited or acquired, exclusive of exposure considerations. It is recognized that of a group of individuals exposed to an occupational carcinogenic agent, some will develop the specific cancer, and others do not. This is an area of research which has been virtually unexplored in industrial studies.

INDUSTRIAL CANCERS (continued)

In terms of compensation evaluation and medical evidence, I should like to caution about undue emphasis on the histological type of tumor. It would be unwise to confine the recognition of occupational cancer, solely to one histological type.

The fact that angiosarcoma, a very rare type of tumor, was observed among workers in vinyl chloride operations is impressive, but the accent on the histological type may confuse in compensation cases. If workers exposed to vinyl chloride in the same work process develop the same disease, a higher number of cancers of the liver, brain or kidney, etc., the cancer should still be considered work-related and compensable, regardless of the histological type.

No one really knows what combinations of length of employment, duration, and concentration of exposure to vinyl chloride or any other agent will provide what kind of pathological response or the precise type and stage of histological change in the various organs among the workers. We do know that in other industrial cancers, for example, lung cancer among chromate, asbestos and coke oven workers, the histological types of lung cancer are not specific, but rather may be different in workers of the same plant or occupation with the same years of employment. This same principle would apply to the lung cancers observed among workers who had been previously exposed to Bis (chlor) methyl ether, where oat cell type of tumors predominate. Workers in that facility will develop lung cancers with other histological appearances, and the increase occupational risk exists, even though the individual oat cell type did not develop.

INDUSTRIAL CANCERS (continued)

Similarly, when leukemia has been identified as a work-related effect in industrial populations, it would be technically incorrect to designate that only one type of leukemia, monocytic or lymphatic, would be considered for compensation.

In another context, there is a distinct advantage and necessity in obtaining the histological information about cancers in deaths of workers, primarily because they help to identify the primary site of the cancer.

The histological results of autopsies usually are not available until after the death certificate has been completed and, therefore, may not be included on the death certificate unless a special query has been made. An example of the contribution of supplementary pathological reports was demonstrated in an asbestos study.⁷ A total of 6 additional lung cancers were identified that would not otherwise be recognized. Associated with this is the importance of having the pathology slides reviewed by another pathologist who may be expert in certain types of tumors. In this asbestos study, the slides were obtained and restudied, and a series of cases of mesothelioma were identified and confirmed, which established a relationship with the asbestos exposure.

All of this has a direct bearing on compensation because, when carcinomatosis is reidentified as lung cancer, or mesothelioma, then the work relationship can be recognized by the doctor, as well as the attorney. To the widow, it means a compensation claim can be filed.

INDUSTRIAL CANCERS (continued)

In my own study,⁷ where the lung cancer and mesothelioma was established, for both men and women, the relative risk for the women workers was higher (by nature of their particular job assignment), with a lung cancer death rate of 4 observed compared to 0.19 expected for (ages 25-64) at death. Further 6 cases of asbestosis were observed among the females out of the remaining 16 deaths from all causes. The study constituted a conservative estimate of risk because of 1) dilution effect of the total plant population 2) the age span did not go beyond age 64 years and further 3) the period of observation to meet the full requirements of the latent period was too short. It so happens that this particular plant was located in "Amish Country" in a rural area, and during the decades of the 40's and 50's, the religious custom was for no smoking or little smoking among men, and even less for the women. This was confirmed by a NIOSH study of the same plant in which 7 lung cancers were observed among the women and 4 were identified by the hospital admission records, as non-smokers.²¹ In essence, the occupational risk existed regardless of smoking.

With this background, I should like now to restate an obvious fact, occupational cancers do not "normally" exist, but rather occur, because of the very nature of the employment or environmental exposure. The cancer risk is inherent in the work environment, by the very nature of the work exposure and as the result of the work exposure. It is the carcinogenic agent, chemicals, etc., which are present or evolve during the work process, that induces

INDUSTRIAL CANCERS (continued)

the cancer, that is the primary cause of the cancer. This is true for asbestos, coke oven fumes, chromate, betanaphthylamine, etc., where the occupational cancer has been established by medical and statistical observation of groups of workers, for long periods of time.

What I have seen and want to protest against in compensation cases is the deliberate misuse of "smoking histories" as an attempt to deny the occupational cancer, because the worker smoked. What has happened, unfortunately, is that there have been repeated efforts to weaken and deny legitimate workmen's compensation claims for occupational cancers because of a past history of smoking. In work exposures where known carcinogenic agents existed and prior medical and statistical studies had established an occupational cancer risk, the company emphasized the smoking history where they had been smoking, to detract from the credibility of the compensation claim.

The point of the matter is that most industrial workers smoke in all occupations and it is the inherent cancer causing agent in these established occupational cancers, the chemical fumes, etc., at work, that is the primary cause of the cancer, whether affecting the lung, bladder or any other organ.

I have seen this in other compensation reports on lung disease. Whenever the worker had a history of smoking, this was the point emphasized by the company, as the causative factor, even though the worker may have been exposed for 20, 25 or 30 years without ventilation, to a high concentration of chemical dusts, fumes, mists, or gases; even though the worker, by the

INDUSTRIAL CANCERS (continued)

very nature of his work had to breathe these dusts, fumes, mists, gases, etc., for every minute of every 8 hours or 10 hour shift for every year over the span of 20 years or more. I have even seen this attempted in cases in which the company insisted the lung disease was due to smoking before they found out the worker was a non-smoker.

The pattern in general by industry over the years has been to discourage the recognition of the industrial chemical environment as a potential reservoir of occupational cancers. As long as the cancers could be attributed to another cause like smoking, then the need and pressures for investigation of the work environment lessens considerably and does not get underway.

In another aspect of medical evidence in industrial cancer studies, compensation cases have been contested, citing that the total plant population cancer rate was not higher than the U.S. population. This is misleading in three respects. First, the use of the total plant population, reduces the rate, because of the dilution effect of using the entire plant personnel as the basis for the rate rather than the smaller number of employees at risk, in particular departments or processes. As has been well demonstrated in the study of the rubber industry, the cancer rate for the total plant population may not be elevated at all -- but when the particular department or processes are studied, the markedly elevated rate for a particular cancer site then becomes apparent.

Second, it has been observed that the general population has sickness and death rates considerably higher than the employed

INDUSTRIAL CANCERS (continued)

industrial population at work. This is due to a number of factors, principally -- the selective nature of employment, the screening of employees with pre-employment and periodic medical examinations, and the general requirement of the nature of work, that those employed, be physically and mentally capable of work. In essence, the employed population may be considered as a "healthy survivor" group. The general population, in contrast, includes considerable numbers of those unemployed, because of sickness, disability, handicap, and previous occupational injury or disease.

Consequently, the expected rate derived from the general population will be higher and this, then, tends to lessen the difference between the observed and expected rates, so the true magnitude of the work-related risk is not reflected.

Third, is that a dilution effect and, therefore, a lower rate occurs when duration of employment is not properly considered in the industrial cancer study.

In such industrial studies, it is necessary not only to match by duration of employment, but by the years in which the initial employment or exposure began. For example, a person with 5 years of employment history starting in 1933 followed to 1964, and a person with 5 years experience starting in 1959, naturally, have markedly different periods of environmental exposure and medical care, although they have the same requirements of a latent period, which may be 25 years for that carcinogen.

MEDICAL RECORDS AND OCCUPATIONAL DISEASE

In this section, I should like briefly to refer to several components of industrial medicine to show their interrelationship in the recognition or lack of recognition of (occupational) work-related illnesses. Some of the components pertain to the status and practice of records in plants, (medical and environmental); the reporting of hazard exposures and how occupational diseases are handled in private medicine. The facets will be considered together wherever possible and in some instances illustrated by specific experiences and abbreviated case histories. The purpose is to emphasize certain principles.

In a small rural area, a small plant employing about 50 women were engaged in the manufacture of carbon brushes for the electrical industry.¹ A number of workers developed a combination of symptoms; their hands would shake; they had sore gums, teeth became loose and were removed; their personalities changed, they became very irritable and for no reason would cry; their husbands said their wives had changed, they were no longer the same person; their memory failed; their writing became so bad they couldn't recognize their own name and so forth. The plant manager said they had trench mouth, the doctors of the community interpret the symptoms as "nervous exhaustion", "overwork." One doctor diagnosed it as metal poisoning.

Workers left because of illness; others returned to work even though they had not recovered because they needed to pay their bills. The company owner said there was no harmful chemicals in the work

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

place. There was a small first aid room attended by someone as needed, there was no nurse or trained personnel.

The request for assistance came from the public health nurse of the community. The investigation identified that the compound contained mercury and mercury poisoning was identified for a large number of the workers.

This case illustrates 1) that in a small plant a major occupational disease can occur and not be recognized because the medical facilities of small plants are not conducive to such recognition 2) no medical records were kept and there was no indication of need to record the symptoms 3) the plant manager did not recognize the occupational illness 4) the doctors of the community did not recognize the occupational illness so there was no reporting of an occupational disease 5) claims for compensation made by some employees were denied because they had not been made within the statutory limits of time required. Others who met the time requirements (after the study identified the problem) were awarded compensation. Other workers who had left the plant several years before would not have recognized that their symptoms were work-related and therefore not filed for compensation 6) there had been no air monitoring, no measurement for toxic substances at this plant because the owner believed that the substance used was not toxic, therefore there were no records.

The investigation identified excessive mercury exposure by ingestion and inhalation and the entire operation was changed and controlled.

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

The point here is that the doctors of the community, although well qualified, had no orientation in industrial medicine; had no facilities of their own to conduct an investigation; and accepted as fact the statement from the company that no toxic materials were used.

In this case an overwhelming occurrence of a particular illness brought the matter to attention in this small plant by the sheer magnitude of the situation in this small rural area. The analogy, however, extends to all other plants where, instead of the entire work force being affected smaller groups of workers (five or ten workers) come down with work-related illness from different causes. In the mercury poisoning the workers all had the same clinical syndrome but in most small plants the recognition (with the same limited or absent medical facilities) becomes more difficult because more than one work-related illness occurs and affects a smaller number. The relative percentage affected is high but there is "no overwhelming picture" to bring the matter to attention.

For all these small plants which exist, not only in rural communities but also in urban areas and cities, the chances for the recognition of work-related illnesses is very limited or nonexistent because there is no one there to do the "recognizing". Certainly there are exceptions but that is a general pattern. Again, there will be either no records or very limited records and of no real use.

Now for the doctors in practice, in general the percentage

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

of worker/patients that he sees may be small. They appear with their symptoms and he tries to rely on the worker to tell him about his work exposure and the worker does not know. The doctor doesn't communicate (only rarely) with the plant, unless it is to write a note requesting sick leave for his patient.

What the doctor writes down in his medical history report is essentially what he can learn from the worker and no matter how hard he will try to find out what the worker knows or knows accurately that goes only to a certain point, and takes a tremendous amount of time in a very busy schedule. So, though the professional intent is there, the combination of circumstances do not permit either the time nor the investigation to obtain all the pertinent information required.

Now there are certain types of illness like dermatitis, which are readily recognizable, regardless of the size of the plant and even without medical facilities the workers will recognize the dermatitis first; they will see the change in their skin and on the workers next to him doing the same job and so forth.

Now such cases of industrial dermatitis rarely if ever get reported as a occupational disease unless disability has become so bad that a compensation claim is considered. In cases of occupational dermatitis, if the company has sickness insurance the company may pay for the treatment and such cases never get reported to the industrial compensation agency. I recall at one small plant learning of about 20 clear cut cases of occupational

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

dermatitis, none had filed a record or claim with the compensation agency. I have also seen similar cases in which the worker is paying all the medical bills and neither the company nor the compensation agency provided any medical coverage.

Now to return to the analogy of the mercury episode. If a group of workers in a town or city become sick they will all go to their own doctor; this means, depending upon the number sick, ten, 16 or 20 different doctors in the city. Each doctor sees one or perhaps two workers from the same plant (even this may not be recognized if the patients come on different days or weeks apart). The point is that if five or ten workers come to the same doctor with the same symptoms employed at the same plant, the association with employment becomes immediately recognizable. Actually a large number of occupational diseases are not being recognized because of the dilution effect of the observation, the dispersion to different doctors throughout the city. (The exception occurs, of course, when a rare disease, like angio-sarcoma, is recognized because of a surgeon who had heard of another case and so forth).

Suppose the illness was not dermatitis but a respiratory problem and the worker was employed in the plant where there was a nurse and a part-time doctor? In this instance the nurse, depending on her experience and training, would record the symptoms, identify the worker in the records, by name, department and job and date of the visit and the symptom complaints and so forth. When the part-time doctor comes, for example two or three times

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

a week, two hours at a time, the nurse calls to the attention of the doctor the recorded visits that show the type of illnesses and so forth. The doctor then may, depending upon his schedule, see the worker and tell him what to do or recommend certain tests.

Now, if a work-related illness does occur there is a chance for recognition but in the part-time doctor arrangements his schedule is so extremely tight that the time to go into the plant or follow through on the cases does not occur. Suppose a work-related illness was recognized by the doctor, what would happen? Usually, a report would only be made if a compensation claim was filed and if the company liability is established. But the compensation liability for lung disease is extensive and "if this case is allowed, then other workers will also want to file a claim". The doctor is placed in the difficult position of wondering how long his arrangement with the company will continue. If proper industrial medical training arrangements were made available for the part-time doctors and they retained their medical independence, the contribution of the part-time physicians in the recognition of work-related disease would be tremendous.

CASE #2

Let's view another industrial situation. A plant manufactures chemicals; employs several hundred men; the company knows the chemical causes bladder tumors; arrangements are made with a consulting urologist to examine workers who show symptoms; all medical

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

costs are covered by medical insurance; the workers have been told about the cancer risk; there is a plant nurse; medical records are kept of the visits to the first-aid department and for all sickness visits; the workers who pass blood in their urine and have symptoms are referred to the urologist doctor for examination; some workers who got sick, left the plant and went to a better climate, Florida, Arizona, or California; workers left and got employment elsewhere.

This case illustrates 1) that the consulting urologist is a physician that saw over the years the same illness among workers employed at the same plant 35-40 or more cases of bladder tumors. 2) An occupational disease report could be made by that physician depending upon whether there was a state requirement for the reporting of occupational diseases and willingness to comply. 3) Such reports would have prompted or should prompt official investigation. 4) Workers while currently employed and receiving medical care and sickness insurance did not file compensation claims. 5) Workers who changed jobs may, while employed in their new job, develop a "work-related illness" that pertains not to his present employer but to his previous employer of many years before. His present employer may not recognize this and the worker may not remember or recognize this.

The workers also went to their own personal doctors and were able to tell their doctors that they were working with betanaphthylamine and benzidine, actually what their work exposure was. This was an unusual situation. But each of these doctors in practice

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

in different parts of the city saw only one or two cases and did not really know the magnitude of the large number of cases occurring and therefore the strong association at that plant was not recognized.

The analogy here to other plants is that where a particular chemical or process in a plant causes a large number of cases, the same type of illness, then the company may decide it is to its advantage to send all the workers to the same specialist. Most frequently the problem is dermatitis and a dermatologist is selected. If respiratory disease is a problem, as happened in the beryllium plant, when a consultant in respiratory diseases was retained to see the patients from that particular plant. This also applies to lung surgeons, for example, the lung cancer cases from the chromate plant would generally end up with those few surgeons in that area doing that type of work.

The point here is that in general practice, frequently it is a specialist who can provide a strong clue to the recognition of an occupational illness by the pattern of cases with similar symptoms of disability coming from the same place of employment. So whatever efforts may be considered for the development of a system of recognition of work-related diseases, by physicians, it would seem that the start could be with arrangements with specialists to provide the clinical epidemiology. In essence, the clustering principle of the recognition of a work-related illness, as observed in epidemiological studies of industry, also applies to the clustering of cases of the same type with the same physician specialist.

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

For the workers who left the plant and died in another state years later (because of the latent period) they would not come to the attention of any investigator who confined his observations solely to the state where the plant was located. Further, unless the family remembered about the work exposure it is unlikely that a compensation claim would be filed. Then if a claim was filed depending upon the state and other circumstances the statute of limitations may have expired or some other requirement would make the claim ineligible.

The doctors who take care of these workers in another state (even in the same city) surely do not know where this man worked 30 or 40 years before. This emphasizes the limitation of occupation and place of employment on the death certificate and in hospital records.

The workers after they leave the plant may have extensive medical bills, as their sickness occurs intermittently, through the years until death. But unless they had filed a claim when they left the plant, which is most unlikely, they will have paid their own medical and hospital bills all those years. So sickness records as a source are only effective during employment. The other point is that when the worker leaves the plant the insurance policy stops, although an option for life insurance is offered. Workers from this plant in their new job at another plant, may develop a work-related illness that pertains to a previous employer years before.

MEDICAL RECORDS AND OCCUPATIONAL DISEASE (continued)

This case was straight forward relative to the occupational risk, medical care, the acknowledgment of the risk, and the informing of the worker.

What the case does not illustrate but what happens only too frequently is the reverse situation. There is no acknowledgment by the company of the cancer risk; no information to the worker; compensation claims are contested; the doctors of the community do not know of the cancer risks. In such circumstances it is virtually impossible for the worker to file a compensation claim. Records may not be kept or if kept special arrangements of confidentiality have been established. The plant physician may know of the cancer cases but is restrained by the lawyer of the company who determines what is best for the company wherever liability is involved.

The primary consideration of records is the accuracy, completeness and purpose of what is recorded - what is on the record, how it is recorded, how well the records are kept, are important. The mere existence of records may convey validity but does not mean that they are valid and accurate. The value and usefulness of the records for medical and compensation purposes depend upon who is recording the data, the experience, training and motivation of the individual.

OSHA STANDARDS AND COMPENSATION

Since the advent of OSHA and the promulgation of Standards (air contaminants and many other work exposures), the question has been raised as to the compensation implications -- will the standards make any difference? Will they increase the compensation claims?

Basically, whatever the standard accomplishes to bring about, the recognition of work-related illness and the development of evidence, (facts,) and work exposure, will eventually determine the nature and rate of change in compensation claims. If certain factors essential to the recognition of work-related illness are incorporated in the standard, and recognition becomes possible recognition always preceeds any compensation capability.

The adoption of the standards alone by the government is not enough. What is required is that a national program of worker education, the provision of information to help the worker understand the contents of the standards should be established. (A national library of video-tapes and audio-visual materials could be prepared by a joint effort of University, labor and management on the work environment and related-health problems, which could be duplicated and made available to every union and industry, is one approach. Similarly for future wage earners, the nature and the scope of hazards at work with appropriate prevention, laws, etc. could be part of the curriculum of high schools, colleges and universities). As the situation now stands, any real change in the recognition of work-related diseases may well stem from

OSHA Standards and Compensation (Continued)

the supporting efforts of the worker's representatives, the Unions.

Although the standards do vary, there is a consistency of inclusion of certain requirements, factors, which are essential to the evaluation of toxic effects and the proper means for prevention and control. In the overview and in long-term considerations, the standards should bring about an increase in the recognition of work-related illnesses and, subsequently, an increase in compensation claims. Some of the factors that will bring about this development, their potential and their limitations will be briefly mentioned.

Although the promoting factors in the standards exist, unless there is compliance by the companies, the standards have no real meaning, except that they exist legally. A legal reference print is very helpful and the standards are necessary, however, bringing about their implementation is another matter.

In essence, if there is compliance with the standard, then, the component parts will bring about, in sequence, recognition of work-related illness, compensation, prevention and control of the problem. If, however, there is no company compliance, then, the promoting factors for the recognition of a work-related illness cannot and do not function, except by chance. In those circumstances, there is very little if any change in status of compensation claims.

The pattern then is, that there will be a growth of factors in the plants to bring about recognition and when there is default of compliance, a series of outside approaches will evolve to bring to

OSHA Standards and Compensation (Continued)

the worker, the basic information he needs for the recognition of work-related disease.

I should like now to focus on the positive side of the standards, to discuss the promoting factors for the recognition of work-related illness.

Since each standard is adopted because of the known health effects, the requirements specified include the components necessary for detection, prevention and control. The broad categories are: information, medical, environmental and records.

The first promoting factor in the recognition of work-related illness are the warnings, the label requirements and the specification to inform the workers of the hazards. Although this is a basic requirement of the Federal Act itself, that the workers be properly informed, nevertheless, each succeeding standard reinforces that objective.

Now, the effectiveness of this requirement, like all other requirements of any standard, depends upon just what the company does or does not do, and how thorough the information is.

If the worker is informed, at least his awareness of the possibility of the health effects have been established, and from that he may be more receptive to further information and, gradually, be sufficiently informed to recognize what is happening to him or his fellow workers, doing the same type of work at the same place, using the same materials. The combination of information from what the company provides, together with the direct information from his union, will be sufficient to raise rapidly his powers of recognition of work-related health problems and, eventually, the development of compensation claims.

OSHA Standards and Compensation (Continued)

The second promoting factor is the requirement pertaining to medical examinations; the pre-employment, the special procedures and tests required (depending upon the standard), chest x-rays, blood counts, pulmonary function tests, etc. Basically, the medical requirements of the standard, establishes a minimum type of medical program and, in effect, establishes that there shall be such medical programs, where none may have existed before or were less than adequate.

In order to carry out these procedures, there must be developed at each plant, the medical facilities, the arrangement with a doctor and a nurse to carry out the requirements of the standard. This input then, of access to professional staff, establishes the potential for the recognition of work-related illness. Again, the tests specified in the standard will bring about the detection of health effects, and in any such change in the health status of the workers, the medical responsibility is to inform the worker. So, in this sequence, the possibility of recognition of a work-related illness, increases and the linkage to compensation is also possible.

Another aspect is that such medical records could be made available to the workers, physicians, and in this procedure work-related illness identified.

The third promoting factor relates to monitoring the work place. Every standard makes provisions for testing and measurement of the designated toxic or injurious agent, by requiring that the level of the particular air-contaminant, for example, not exceed certain specified concentration.

For the company to determine whether the levels in the work place exceed the level in the standards, air monitoring and other

OSHA Standards and Compensation (Continued)

measurements are required. Further, in order to be able to demonstrate that there was compliance, records of such measurements are made and retained by the company.

So, the third potential promoting factor is the environmental measurement of the work environment. However, this factor is complex, and may operate in different directions. The company may monitor the work environment as specified in the standard and not inform the worker, even though the law may require this. If the worker then does not get the results, the air measurements, have no meaning; are of no use to him. In such instances, the results are solely at the discretion of the company for its own use.

However, if the standards do specify that the results of all such monitoring for the particular toxic substance should be made available to the worker -- on the basis that he has a right to be informed of the hazard and of the potential effect, then, recognition of work-related illness can come about and compensation claim can be considered.

The fourth promoting factor is the requirement pertaining to records, medical and environmental, and their retention for so many designated years, with appropriate safeguards for their protection.

This, then, makes possible for workers in succeeding years after they have left the plant, and may have developed a work-related illness, to request and obtain the necessary data pertaining to their prior medical examination and tests, x-rays, blood tests, etc. Further, the companies are obligated to keep the necessary personnel records, which specify the dates of employment and specific departments and occupations.

OSHA Standards and Compensation (Continued)

The standards, then, raise the level of record keeping by specifying certain requirements, and this applies wherever the standard applies. In essence, the significance, the importance of records are emphasized, and this establishes the pattern for each category of the standard, medical and environmental.

The state compensation agencies can, because of the known requirements of the standards, then request the complete work history and data on work exposure, in their investigation and evaluation of compensation claims.

Now, when a standard is in existence, and there is a violation of that standard, i.e., that the level specified in the standard has been exceeded at the work location and the worker, at that location, develops an illness (whose symptoms are known to be associated with that particular toxic agent), then the reasonable presumption of causality can be made.

An injured employee should have recourse to the findings and records of OSHA and NIOSH, and of the State Compensation Agency, relative to the conditions of his work environment, as may be necessary, to properly present his case under workmen's compensation or civil liability.

All medical and environmental records should be made available to the worker and his doctor, regardless of existence of a standard pertaining to particular substances.

RECOMMENDATIONS

I should like to focus on some long range and some immediate approaches to identify work-related disease/illness and to ascertain the magnitude of the risk for the industries throughout the country.

Although each recommendation is national in scope and has its own contribution and objective, nevertheless, my purpose is to show the interrelationship of a series of recommendations and hopefully establish the foundation for a mechanism of continuous epidemiological medical surveillance for the recognition of adverse health effects in the industrial population and the subsequent consideration of prevention and compensation. There is certain background information which provides the rationale and feasibility that I will discuss prior to each recommendation.

It must be understood that the medical evidence that would meet the statistical criteria of probability for the identification of adverse health effects is primarily epidemiological, involving the studies of selected industrial populations with defined characteristics followed for a sufficiently long period of time.

In the study of long term delayed work-related illness, for example, cancer in which the latent period for the clinical appearance of the disease may be 30 to 40 years, it is necessary to establish the employee population, the population at risk retrospectively that many years in the past for the partic-

Recommendations (Continued)

ular plant and company. The objective is to utilize the intervening years which have already lapsed and met the criteria for the latent period, the results of which could be obtained in a short period of time rather than to initiate an epidemiological study now and then have to wait 30 to 40 or more years for the results.

Further, there are two major objectives to be able to: a) study plants in which carcinogenic or adverse health effects are suspected by reason of some recent experimental results or medical reports and b) to evaluate industrial chemicals and products which have not been studied before as a means of uncovering and identifying adverse health effects which have not been recognized as a basis of prevention in their continued use. The objectives and needs can be expanded but this essentially has been the overall concern in the recognition of work-related illness in the United States.

The basic problem that has prevailed for years which still exists but can be overcome is that the necessary personnel records for each plant are invariably destroyed after ten years or even less and most often are incomplete and not uniform. Yet, it is the personnel records of the particular plant that identify and define the employee population working at that particular plant for designated years, exposed to certain processes or chemicals, that are important.

So the initial national problem was the inability to identify and define the employee population of specific plants

Recommendations (continued)

in the past in order to ascertain the basic impact of the work environment, i.e., what the long term biological effects were of specific environmental stresses and employment in specific industries.

Further, where a higher rate of lung cancer, for example, occurred in certain geographical units, city or county, in order to determine whether industrial work exposures were contributing to that excess, it is necessary to know for all those who died from that specific cause of death, what was the entire prior employment history for each worker prior to death for comparative purposes and analysis.

Finally, it was and it is necessary to evolve a methodology that is national in scope, that is accurate and complete with uniform employment records of all industries; that would provide the means to follow-up and trace the employees over decades regardless of their place of death; and that was economically feasible. Then, again, the method would have to have the capability of reproducibility; that is, any other investigator could conduct the same study using the same data and derive the same results.

I am referring to the Social Security approach to industrial epidemiological studies originally developed and demonstrated by Mancuso in a series of studies over a span of 25 years, that
6-11
forms the basis of the first recommendation.

In order to appreciate the potential and feasibility, I will, briefly, review certain facts relative to the Social Security data which have been and can be applied to industrial research studies.

Recommendations (Continued)

1. Social Security has maintained on microfilm, permanently, all the employee records submitted by every plant covered by Social Security, since 1937. These quarterly reports submitted by each company contain every name of each employee, and the social security number of each employee for the period that the report covers. This applies to all industries nation-wide and relates to every quarter of each year.

2. Social Security from these reports and files on each employee covered by Social Security can determine precisely the dates of employment and duration of employment of each individual of that plant and for every plant that the individual was employed in.

3. Social Security can identify all the employees characterized by birth date and sex and social security number, i.e., the employee population at risk for any individual year or successive years or combination of years for any time period since 1937.

4. Social Security has classified by industrial and non-manufacturing categories the particular type of industry and the products made for the industries covered.^{16, 17} This is derived from the data filed by each company and the classification serves as a basis for selection for studying any particular chemical products or types of industries or any individual company.

5. Social Security can reconstruct for each covered employee by social security number all prior employment and sequential employment regardless of the number of different employers and also provide the duration of employment for each former employer

Recommendations (Continued)

together with the four digit industrial or non-industrial manufacturing classification.

6. Social Security can identify all those who have died who were formerly employed in a particular plant regardless of the place of death or year of death since 1937. These data serve as a basis for the request for death certificates in the corresponding states to determine the cause of death of the former workers.

7. Social Security in addition to death benefits has initiated disability coverage (within certain limits) since 1955 that is identified and linked by social security number.

The point of all of this is that there does exist a national resource, which is uniform and provides a chronological work record on every employee with a social security number; that all the employees of a particular company at any point in time since 1937 can be identified within the Social Security Administration as a cohort for epidemiological study; that all the deaths that have occurred for this group can be determined by Social Security strictly by use of its own facilities.

In essence, the basic requirements for the conduct of epidemiological studies of any plant covered by social security since 1937 can be carried out by Social Security internally by its own research staff. The main point is that the Social Security Administration national resource overcomes the destruction of the personnel records of all the industries during the past 36 years and makes possible, as has been demonstrated repeatedly, that

Recommendations (Continued)

epidemiological studies can be carried out of workers employed, for example, 1937, 1939, 1940-1942, 1948 and so forth and followed through 1975 and for any later year to ascertain causes of death. Actually, there is no cutoff date for follow-up since the social security process is continuous so that the same cohort of employees can be reprocessed internally by Social Security and a follow-up made in 1980 and in any succeeding year. This is mentioned because by this method the problem of long-term follow-up of employees for sufficient long periods of time, 30 to 40 years or more, can be accomplished.

So, my first recommendation is that:

1. The research department of the Social Security Administration should conduct, as part of its normal governmental operations, the necessary industrial epidemiological studies of industries to provide, on a regular basis every three years, the statistical mortality pattern for the corresponding industries by selected categories and types of industries and geographical areas. In essence, I consider this a governmental function and the reports can be similar to the annual statistical reports put out by the division of vital statistics relative to causes of death by region and state. The Social Security reports would, instead, relate to industries by type and products.

This then would constitute the foundation for other more refined approaches. Nevertheless, it provides the means over time to learn from the past just what did happen to the workers employed in certain industries as a clue to further investigation, prevention and compensation.

Recommendations (Continued)

What I am suggesting is that the epidemiological work that individual investigators have been attempting on a very limited basis has already been demonstrated to be economically feasible, at a very low cost; that these studies can now be carried out on a national scale by the research department of the Social Security Administration.

In this way, the magnitude of the problem of work-related deaths from specific causes for various types of industry as posed by the questions to this symposium, can be approached.

This then is the foundation and a series of recommendations or means which are required to implement the approach to further refine within an industry the magnitude of the work-related problem. For example, if in the quarterly report filed by each company, the department or occupation code is included, then the feasibility of isolation of the problem to specific departments of processes becomes a reality.

Again, these considerations refer to the building of foundations of effort. There is no single approach that can provide all the answers to determine the magnitude of the work-related medical problems.

All the federal agencies, OSHA, BLS, and NIOSH can bring to bear their interests and requests to the research department of the Social Security Administration and cooperative plans formulated for the conduct, analysis and reports of the findings. However, it is basic that in addition, a uniform statistical system of analysis and reporting on a regular basis be carried out.

Recommendations (Continued)

2. The second recommendation is one of development. That steps be taken to develop the use of social security disability resource for linkage with industrial mortality studies, to provide statistical disability profiles by type of industry and occupation.

Exploratory pilot studies have been conducted which suggest that the research potential exists, but the organization of such efforts must be developed. It is already well recognized that mortality and causes of death do not reflect the diseases which have occurred prior to the death and are not recorded on the death certificate.

Disability then, i.e., whether there is a pattern from specific causes of disability for each type of industry and occupation, can be derived from the data recorded on the disability claims.

The point is that a national system resource on disability exists which can be developed and applied and can supplement, as another index, the estimation of the magnitude of the work-related disease/illness.

The methodology and procedures for statistical analysis of disability can be conducted internally by Social Security Administration. In this way, the epidemiological potential of the disability (morbidity data) for industrial studies can be combined with mortality studies.

Recommendations (Continued)

TRADE-NAME PRODUCTS

My purpose has been solely to surface the national problem relative to trade-name products in order to develop the necessary awareness of how the lack of the technical information pertaining to the chemical components impedes the development of medical recognition and causality of work-related disease/illness throughout the country.

The compensation authorities have a responsibility pertaining to trade-name products to help develop whatever technical resources are necessary for the proper adjudication and administration of the compensation process.

At present, the NIOSH attempt at developing a national trade-name inventory is in the right direction but, unfortunately, lacks at present any real compliance by the industries involved. Where the potential impact of a medical problem exists, which may establish liability, the company may decide not to respond to any request from NIOSH for this information, or when provided may be in such general terms as to be meaningless for the questions posed.

The document by NIOSH "recommended standard and identification system occupationally hazardous materials" addresses itself to the major objective but does not resolve the problem. Further, the compensation authorities have a responsibility to determine what factors inhibit and restrain the purpose of the laws and to take the necessary steps to alleviate these problems.

I would recommend: 1) that a national registry of trade-name products with a listing of chemical components be established as a national technical resource for the evaluation of work-related illnesses; 2) the necessary legal requirements be established

Recommendations (Continued)

to bring about uniform compliance for complete data by companies manufacturing the trade-name products; 3) that the necessary toxicological data be compiled by appropriate governmental agencies on each of the chemical components; 4) that a system of identification retrieval be established to facilitate rapid response to requests from physicians in practice, relative to the evaluation of medical problems, and made available to the worker through his medical or legal representative as may be required by compensation authorities.

The objective of establishing the basis for the readily available information is what is most important. I do not presume to determine the precise mechanism to bring this about. Within this context a supplementary approach toward this objective would be to focus on the individual plant.

In this approach there would be a joint legal federal and state requirement that each plant utilizing the chemicals, develop and maintain appropriate records, chronologically over the years, so that the necessary information as to which trade-name product and chemicals were used at different points in time would be available for consideration upon request of the compensation authorities, as well as from NIOSH, OSHA or the physician providing medical care to the worker.

There is already sufficient legal support expressed in the interpretation of the federal legislation in OSHA that requires the employer to adequately inform the worker of the hazards of his job and to take such steps as are necessary to prevent harm

Recommendations (Continued)

during the course of his employment. Further, the company is required to advise the worker if he has been excessively exposed beyond the limits of the air contaminant standards developed, etc. This is my understanding.

This means that first, the company itself is required to know the toxicity of the trade-name products used and all other chemicals used in order to carry out the requirements of the law to properly warn and protect the worker at each employment. If the company does not know, then it cannot comply with the intent of the legislation. Similarly, a company must know the chemicals used and generated in the work environment in order to determine what air-sampling is required for the chemicals and agents specified in the air contaminant standard and in other standards. The company must know whether it is in compliance with the standards.

In order for the company to comply to OSHA as well as to compensation needs, it must, therefore, develop and maintain the proper records and obtain the necessary toxicological data for the trade-name products and chemicals used in the respective departments and work processes. In so doing, the company establishes a basis to meet the needs for compensation considerations as well.

In a simple version each plant develops and maintains a hazardous substance manual. The manual could very well include toxicological and data safety sheets and the safety and medical precautions required for each chemical and trade-name product. Since many changes occur it is necessary that the records be accumulative and chronological over the span of years and that

Recommendation (Continued)

appropriate safeguards and legal means be established to hold the company responsible for the accuracy and completeness of the information recorded.

At the same time an air-sampling measurement report manual should be maintained to show a) whether air-sampling has been done or any other measurement, b) where the sampling was done in respective departments and processes and c) the results of each of the tests.

It is important to recognize that the provision of identity of trade-name substances alone only provides a clue as to the direction to seek the toxicological data. Any development relative to the chemicals must have the concurrent system which provides the necessary toxicological data for each of the chemical components and all the various chemicals used.

In this approach within a local community a mechanism could be established so that the physician can obtain the information on specific chemicals on behalf of his worker patient directly from the company, then supplement that information by querying the national federal resources as may be required.

MEDICAL SERVICES

The following comments and recommendations relate to attempts to resolve some of the difficulties relative to physician participation in workmen's compensation.

Basically, there is a combination of factors which in themselves make the physician a reluctant rather than an enthusiastic

Medical Services (Continued)

participant in compensation cases. These problems have been with us for years. They are chronic, they are cumulative and whether by design or not they have discouraged the participation of physicians in compensation cases.

The objective of compensation administration is to determine and surface these problems and to provide some innovative procedures, if possible, to at least remove whatever obstacles exist to bring about more adequate physician participation. It is a remarkable tribute to the physicians that do participate, they do so out of their responsibility to and interest in their patient, to protect his or her health and rights. But for even these physicians the compensation procedures can be quite a strain in time and effort.

It is true, every case more or less has a medical report and, therefore, a doctor has participated, but the point is the degree of participation which in itself may well decide a particular case. The very nature of compensation, the intricacies and the complex nature of the work environment are extra burdens and responsibilities in dealing with a work-related illness in contrast to a common ailment.

In terms of time for the evaluation of work-related illness (in comparison to other illness) it is many times greater. In addition to the clinical examination there must be a major effort to determine and understand the complex chemical work exposures and to obtain this information requires multiple efforts, to multiple sources, over extensive periods of time. Further, additional supplementary efforts are required for toxicological data and medical literature references. In essence, each case can be a major endeavor.

Medical Services (Continued)

The objective would be then to develop the necessary technical resources that the physician can turn to to quickly give him the information he needs. The combination resource already mentioned of trade-name products correlated with toxicological data would be a firm foundation as a start.

Another supplementary approach is for the compensation authorities together with OSHA and NIOSH to support further the development of ^a/continuous system of ready access to clinical and research reports on work-related illness for the doctors. A means must be developed so that the physicians can be relieved of the burden of searching for necessary industrial medical reports. This can be accomplished as one method by application of the Medlars system now already in operation where the medical search can be made by computer, through the National Library of Medicine, provided that all the back accumulation of industrial medical literature and reports could be abstracted, indexed and integrated into the system.

Associated with this must be some means to provide regular seminars and training sessions in industrial medicine with proper reimbursement for time and credit and whatever combinations of effort that may be required, so that knowledge of industrial medicine becomes a normal function of the doctor's practice. Related medical information approaches on current medical information are now in operation for each speciality and practice of medicine, but, as far as I know, not in industrial toxicology and industrial medicine.

Medical Services (Continued)

In this approach, monthly current digest reports are made of the latest observations and findings in the literature and are provided on tape cassettes for distribution to physicians in practice.

My concern is how to bridge the medical gap that exists from what was not provided to the physicians in medical school and in subsequent years, with the present recognition of the importance of the microchemical environment and the development of disease; how to bring this information to the doctor without interference with his private practice; how to bring about the contribution of the private doctors to industrial medicine and to quality compensation evaluation.

There is one approach to the development of necessary input on the technical aspects of the work environment that would be applicable for physicians operating as a group or for the physicians of a hospital. The recommendation for consideration is the inclusion of an experienced industrial hygienist to serve the needs of all the physicians of that group or hospital on a regular daily basis and also serve physicians within certain geographical areas as a consultant.

In essence, the practice of medicine requires the expertise of an industrial hygienist or industrial hygiene engineer on the staff of the group or hospital for the evaluation and assistance in industrial health problems. Similarly, a consultant toxicologist could be provided on a regional basis, privately or as a public service by a representative of NIOSH.

Medical Services (Continued)

Arrangements could be made through adoption of certain procedures and regulations by the compensation authorities to authorize the industrial hygienist to conduct the necessary surveys in an industrial plant as may be required by the doctor in the evaluation of a particular compensation problem, with reimbursement of course, by the compensation authority. This is one means to bring to the doctor the necessary information of the work environment that he requires. It would also be desirable to provide arrangements so that the physician in practice, if he wished to see the work environment on a compensation case, could obtain this information first hand.

The area of immediate concern is the provision of medical services to small plants to develop some mechanism so that the necessary medical and industrial nursing services are available to the small plants which is the foundation for direct observation on work-related illnesses for a large proportion of industrial workers. No one knows the answer to this requirement and my objective is to provide further recognition to this problem. Again, unless there is recognition of work-related illness the worker is deprived not only of his health but of what he is allowed in terms of compensation.

Historically, several attempts have been made for groups of industries in a confined geographical area to be served by a small industrial medical center and this is one approach which can be very effective.

I do believe another approach is to recognize that the industrial nurse is and will continue to be the primary key medical

Medical Services (Continued)

observer for the small plants; that appropriate steps should be taken for special advanced training for industrial nurses in occupational diseases, toxicology, epidemiology and records, and such other technical aspects relating to medical observations as may be necessary, and that this higher level of responsibility for the industrial nurse be given the necessary professional recognition.

The compensation authorities, as well as OSHA and NIOSH, have joint responsibility to provide the necessary mechanism for the training support and the development of appropriate records to facilitate the recognition and reporting of work-related disease/illness.

In the consideration of industrial medical services, criticism has been expressed as to whether the plant doctors and nurses are coerced to be less than objective by virtue of their positions. The essence of the criticism is the dependency of the physicians and nurses on the company for their own jobs and future. It is felt this influences their interpretation in particular of potential compensation cases where the company is faced with expensive costs. The continuity of medical services provided by the doctor and nurse should not be dependent upon decisions favorable to the company. Criticism has also been expressed relative to the confidentiality of records.

There is a definite way in which this major problem and underlying national criticism can be removed which has been suggested by a number of doctors who have considered the problem.

Medical Services (continued)

The recommendation is to make the industrial medical operation independent of the company function and administration and provide these industrial medical and nursing services as independent contractors within the same plant physical facility. In this way, the necessary confidentiality of medical records and independence of records and medical operation and interpretation of medical problems can be carried out with the same independence as private practice.

It is the physician who should make the final determination as to the range and scope of the medical services and staff necessary to provide the high quality of medical surveillance required for the early detection of work-related illness in the complex work environment.

I do believe that such changes for the provision of independent industrial medical services will be most helpful in resolving the many problems which have existed for decades in industrial medicine.

Within this context, my recommendation is that all the professional industrial hygiene services, required for the monitoring and evaluation of the work environment be independent of the company; that such services be provided as independent contractors to function with the Industrial Medical Resources.

One final recommendation on medical services and compensation is that the worker should be given free choice of physician (medical and surgical) in compensation cases and that proper safeguards be instituted to protect the medical rights of the worker. The decisions relative to the entire scope of medical

Medical Services (continued)

care for diagnosis and treatment for the worker should rest, solely, with the physician and not with the insurance company or any other agency. Regulations and appropriate steps should be taken for this purpose and also to provide for proper procedures to overcome the delays in reimbursement for adequate medical costs in compensation cases.

GENERAL COMMENTS

Compensation is the wrong word. When a man loses his hand, his foot or his lungs are destroyed, there is no way to "compensate" that man or his family for that loss. There is no way to restore either his health or to restore his particular work capability. There is no way to "compensate" a skilled worker whose bodily functions to apply his skills have been destroyed.

Compensation in terms of partial economic payment, cannot ever compensate for the human and social consequences of that disability; there is no compensation for the man to be reminded every day, to feel and see his disability, his loss of function, for every year for the remaining years of his life; there is no compensation to repay for the permanent denial of all the expectations and hopes of one's life, or for the changes and loss in hopes for each member of the family in terms of education, housing and food, in the years ahead. Compensation, the economic payment can never repay the loss of health - the inability to breathe or to walk, to just perform the normal function of living.

Further the practice of the companies to "let go" of a worker, during the course of time, who has developed serious lung disease or lost a hand, etc., and therefore can no longer do the job, places the worker in double jeopardy. He gets penalized for getting sick by losing his health because of the work exposures and then loses his job, because he got sick, or lost his hand, etc., and no longer can do the work. In contrast, the mere token payment of weekly "benefits" by the company, for a specified period of time becomes a form of absolution of fault and responsi-

GENERAL COMMENTS (continued)

bility for the tragic consequences which occur.

There is a fundamental inequity in the prevailing Occupational Health Safety System. There is something lacking which allows such practices without proper protection of the worker, and which does not provide for adequate penalty incentives to the company to prevent the occurrence of work-related illness and injury and which does not provide for a better recourse for the worker to recover damages compatible to his loss of health.

Hence, there has developed a tendency to seek third party damages both because of the inadequacies of present compensation benefits and the lack of proper inducement to bring about work place improvements. Although these suits may result in costly settlements, the only sensible response is to institute proper prevention and control measures at the work place. Until such time as this occurs there will be a corresponding rise in third party suits.

SUMMARY

I should like now to pose a series of basic questions, all interrelated, which reflect and summarize some of the problems of the workers in compensation claims.

How can a worker file a claim for an occupational illness, or disability, or his widow and family file for a death benefit when the worker doesn't know, when the family doesn't really know the chemicals, the hazardous substances to which he has been previously exposed during his employment; when he has not been told, and can't find out the chemicals that are in the trade products that he is exposed to at work; when he has not been warned about the harmful effects, the toxicological and cancer effects of these chemicals at work?

How can a worker file a claim for an occupational illness when his own doctor doesn't know the chemicals and hazards in the work place -- what the working conditions are; when his own doctor doesn't know the trade-name products used, nor the multiple chemicals within each trade product, nor know the toxic effects of each of these chemicals?

How can the worker know about the harmful effects on the job if there is no plant doctor, or if the doctor doesn't know the toxic exposures, or if there is no system of medical recognition of occupational illnesses, no system of environmental monitoring, no system of toxicological information, where records are not adequate, where all essential information, even if in existence, is not available to the worker?

How can a worker recognize an occupational illness or toxic

SUMMARY (continued)

effects of chemicals when the industry has not been required to conduct adequate experimental testing of the thousands of chemicals prior to their use in industry; when there have not been the necessary studies, not only of the individual chemicals, but even more important on the combinations of the thousands of industrial chemicals used in industry.

(The point is, that as long as the necessary scientific studies relative to the known and unknown hazards are not carried out -- and thousands of such studies are required, the true magnitude of the scope of the health problems due to the industrial chemical environment will not be uncovered and made known to society).

How can a worker file a compensation claim, when the compensation laws do not properly recognize the scope of occupational illness and disease; when state compensation laws have not kept pace with industrial complexity, nor with the known scientific developments on delayed health effects of chemicals?

Finally, there are the personal and socio-economic equations relative to the recognition of occupational illnesses.

How can a worker file a compensation claim, when the worker is intimidated by the fear of losing his job -- when even the fellow employees fear that the acknowledgement of the health problem or support of a compensation claim may cause them to lose their jobs -- in essence, when the fear of punitive action by the company operates to discourage the filing of compensation claims?

How can the worker hope for compensation, when the worker

SUMMARY (continued)

does not have the professional consultants, the industrial medical experts, the industrial hygienist, the chemists, and laboratory to turn to for evaluation and testimony; when the entire burden is placed upon the worker to prove his case?

Then, finally there is the series of obstacles -- the interplay of the company, the insurance carrier and the legal, medical resources of the company, that have been used to delay, and deny the proper recognition of occupational illness, disability and death and its compensation. It is bad enough for the worker to get sick, to be hospitalized, to be disabled or lose his life, but then, to force the worker and his family to, literally fight for compensation, which itself cannot repair or restore his health, is an unfair and cruel burden placed on the shoulders of the workers throughout this country.

There is a definite and strong need to substantially improve our compensation system in the U.S. immediately. The failure to do so can only lead to the alternate choice to devise a new system.

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Occupational Disease
and High-Risk Groups

by
Sheldon W. Samuels

Presented to Interdepartmental
Workers' Compensation Taskforce

University of Chicago
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With the passage of the Occupational Safety and Health Act -- more than five years ago -- there has been important progress in the identification and control of a number of environmental agents associated with occupational disease, most notably occupational cancer. Advances have come from epidemiological study, from the laboratory, and from the clinic. These achievements confirm predictions ridiculed and ignored. They permit us to state -- unless the doubter achieves an amendment to the laws of nature -- that the trends of industrial production bode further disaster.

A few examples of occupational cancers include:

- * lung cancer with coken oven work
- * fluor spar mining
- * vinyl chloride angiosarcoma
- * asbestos lung cancer
- * arsenic lung cancer
- * nasal sinus cancer in woodworkers and platers
- * BCOME respiratory cancer
- * peritoneal and pleural mesothelioma with asbestos
- * asbestos gastrointestinal cancer
- * analine bladder cancer
- * uranium mining lung cancer
- * benzene leukemia

One of the most important concepts Mancuso, Selikoff and others repeatedly establish is the long period of clinical latency between onset of exposure (or, perhaps more accurately, "effective exposure") and evidence of clinical disease. This "silent period" between initial effective exposure and the discovery

of disease is of more than theoretical interest. It offers an opportunity, a possibility, that intervention during this time might be successful in breaking the links between exposure to an agent and preclinical disease, between this stage and the development of early stages of clinical disease, and between these stages and uncontrollable disease.

While there is no guarantee that it is certain or even likely to be the case, we should at least find out whether it may be feasible to break at least some of the links in that chain of events. The observation of Schneiderman, that we can expect 10,000 deaths from bladder cancer and that half of these lives can be saved by existing methods of early detection, points to such a possibility.

For these reasons, it is suggested that, as a matter of national health policy, intervention in the natural history of occupational disease, to identify and follow what leads we might now have, should occur without delay even if that means the creation of a concurrent federal system of health care research and delivery for high-risk populations.

I would prefer that the existing system or the currently proposed systems be modified. For this purpose, the debates on national health insurance and workers' compensation would have to really focus on identifiable high-risk groups. Since the debates are politically interminable, even this may not be adequate. We must simultaneously try to press for passage of pending legislation, force implementation of existing legislation, and initiate a renewed legislative mandate to extend assistance to workers and families in high-risk groups.

The implementation of existing legislation can be accomplished by a taskforce created in the Department of Health, Education and Welfare. The purpose of the taskforce would be to coordinate and reorder the priorities of the National Institutes of Health in order to fill the gap that currently exists in our disease control and prevention programs. There is no definable program of clinical and laboratory research for the large populations of workers, their families and others for whom a high risk of occupational and environmental-related diseases has been defined. That is, no national program of intervention research and application exists.

What are some of the high-risk groups for which a national taskforce should be mobilizing intervention teams:

There is some evidence that approximately one-eighth of all deaths among groups of vinyl chloride polymerization workers will be of hepatic angiosarcoma, and perhaps others among them will die in excess of bronchogenic carcinoma, brain tumors and lymphomas. Perhaps 30,000 such individuals are known to be at risk and, if incidence of neoplasms is found to be significantly increased among polyvinyl chloride fabrication workers, that number could grow to one million individuals exposed in the past.

NIOSH has calculated that there are now some one million workers currently or previously exposed to asbestos, the largest high-risk group of which I am aware. Other high-risk populations can be defined by application of the list of 12 occupational cancers given above.

Mancuso, Selikoff, Wagoner, and others demonstrate that epidemiological approaches and methods already have been developed to identify such groups. It has even been found possible to identify groups of individuals for whom the risk is family or bystander as well as individual. Workplace exposure to asbestos, vinyl chloride, lead, and radiation have well documented family or bystander effects.

The knowledge of such high-risk groups carries with it the responsibility of determining whether intervention is possible or, at the least, of establishing appropriate long-term surveillance in the hope of making best use of currently available therapy (and therapeutic advances which may be made).

In the past several years, a number of studies have attempted to identify cancer in high-risk groups at an early stage. They have been uniformly unsuccessful. Perhaps the best documented is the long-term study of Sturgis et al, in which more than 6,000 individuals were followed prospectively with serial x-rays and clinical surveillance. The results were, in the words of the investigators, "disappointing."

Similar discomfort has attended efforts at early diagnosis of hepatic angiosarcoma among vinyl chloride exposed workers. Neither available liver function tests nor radio-isotope screening, nor clinical examinations have allowed diagnosis of this fatal tumor at a time when intervention might have some chance of success. The same is true of clinical observation of workers occupationally exposed to asbestos, with their significantly increased risk of death of lung cancer or mesothelioma.

What I am proposing will necessitate an intimate integration of epidemiological, clinical, and laboratory approaches at the community level. It is not enough to simply talk of "high-risk groups." These must be characterized in detail, including factors underlined by Mancuso, such as nature of risk, level of risk, dose-disease response relationships, level of effective exposure, nature and size of populations at risk, period of clinical latency, interaction of intensity of exposure and period of latency, effect of such variables as age and sex, and multiple factor interactions.

Not fully apparent in the work of Mancuso, Selikoff and Wagoner are cultural factors that complicate the validity of medical history, such as awareness by a father of early stillbirths and awareness by a wife of the nature and extent of a husband's exposures. The impact of cultural factors on compensation

claims and health care delivery can only be speculated upon, but a magnification effect is obvious, and needs definition.

In some instances, action can be taken on the basis of published data. In additional instances, data may exist in the hands of investigators but not published because of a spectrum of reasons ranging from a lack of apparent pertinence at the time of the original report to simple time lag. Reports of research in progress often could be immediately used. Data generation and retrieval systems are feasible which would solve these problems. More difficult is the development of systems at the community and personal level.

First steps have been taken in a few cases. In Tyler, Texas, one high-risk group of asbestos workers, employed 1954-1972 in an asbestos factory, have been placed under surveillance with serial observations. The group has been identified and most members have been traced. Baseline clinical, radiological and cytological studies hopefully will be completed. But there is no reason to believe that what we now know will make any significant difference in the fate of the 850 individuals concerned. In any case, even alleviatory therapy is denied the workers.

In Louisville, Ky., large groups of current and former vinyl chloride polymerization workers have been brought under observation and an intensive study presumably is underway. Initial experience suggests that none of the available tools provide diagnosis of angiosarcoma or other neoplasms (lung, brain, lymphoma) early enough to allow hope for effective treatment. Prayerfully, new ones will evolve from this study.

CONCLUSIONS: Dr. Mancuso's and Dr. Selikoff's and Dr. Wagoner's work is the basis for an important tenet of a national health policy in which worker's compensation is only a part.

* While there must be a tie-in with community resources, including whatever is generated by the corporate physician, action cannot be restricted to these resources. Example: In the kepone incident a number of patients from the same plant with the same symptoms and hazards were not "picked up" clinically or properly reported by the company doctor.

* Dependence on data reported by the BLS or Compensation Boards or the National Safety Council or company-sponsored defensive researchers are relatively meaningless for the definition of high-risk groups. Example: In Wisconsin in 1970 and the first two months of 1971 not a single case of occupational cancer was reported.

* Current epidemiologic methods and utilization of Social Security data are sufficient at this time to permit a massive start in handling high-risk groups. Key to this method is notification of the worker that he is in a high-risk group and referral to a resource center. Matching of exposure, work, and medical history cannot be left in the hands of the unaided worker, the company or unsystematic study.

* Basic personal records of high-risk workers must no longer be held in perishable form as in a company file, but must be systematically fed into a broader system.

* The simplistic use by attorneys and administrators of "cause" in the Newtonian sense crystallized in early common law has led us into a trap. It would be heuristic to drop the word entirely and substitute the term "factor" and the concept of multifactor system which best denotes the biological reality. "Relative risk" for "safe" is another substitute that will go a long way toward

building a new system of language necessary for productive communication in environmental health. Example: If someone talks about smoking or other culturally impacted personal habits as the "cause" of disease rather than as another factor, i.e. an exposure to which a worker also is exposed, then that person will have failed to communicate anything meaningful (other than gross ignorance).

* The key implication of multifactor systems is that the presence of any one adverse factor should (even if it is not always necessary or sufficient for the production of disease) be reason to act prudently for compensation or regulation. Multifactor systems are not a reason to act as if we don't know the "cause" of a condition. Prior identification of one factor (the control of which would reduce risk) may be all that can be concluded. More, the factor may be diffusely defined simply because the subject matter is not amenable to precise definition, or because of the state of the science. Thus a "process" or "condition" may be an adverse factor as well as a discreet agent associated with a state of disease. We live in an uncertain world of possibility in which it is often prudent to act as if we had absolute knowledge.

* Finally, we can no longer see OSHA, compensation, or national health insurance as separate elements or even as a collective total. None of these proposals at this time can be welded without cracks into which workers and families in high-risk groups fall. Example: Compensation can be seen historically as an incentive to correct conditions. Yet, historically, it has failed as an incentive. The Kepone incident shows this failure clearly. Travelers Insurance Company inspectors went into the Life Sciences

plant twice. Regardless of what their reports contained, the only perceptible change in the plant was a new electric fixture. Workers' Compensation must be seen as part of a system of economic justice for the worker, cost containment for community structures that subsidize the employer through assumption of costs, and as an integral part of a total health care delivery system that focuses on the management of disease rather than the alleviation of pain. If its role as an incentive can be magnified, then that is an added benefit.

OCCUPATION AND DISEASE--A GUIDE FOR DECISION-MAKING

Contract 210-75-0075

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Rockville, Maryland

February, 1976

PREFACE

A major goal of the National Institute for Occupational Safety and Health is to protect the health and safety of working men and women. Within the context of the larger program are NIOSH efforts directed toward the prevention of occupational diseases and the identification of those disease conditions that are occupationally related.

This document is a contractor's report of a NIOSH project to prepare guidelines to aid State agencies, physicians, and others with decision making for occupational disease compensation. The project was developed by NIOSH in conjunction with the Institute's participation in the Interdepartmental Workers' Compensation Task Force, and a limited release of the report is made at this time for purposes of discussion. A decision regarding publication will be made at a later date, based in part upon comments and suggestions for revision obtained during the Conference on Occupational Diseases and Workers' Compensation to be held in Chicago on February 10-12, 1976.

National Institute for Occupational
Safety and Health
January 1976.

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

TO : Ms. June Robinson
Interdepartmental Workers' Compensation
Task Force

DATE: January 26, 1976

FROM : NIOSH Project Officer, Contract #210-99-75-0075

SUBJECT: Contractor's Report "A Guide for Decision-Making"

This will confirm your recent request for a limited number of copies of the above-cited Contractor's report to use for discussion purposes at your forthcoming Conference on Occupational Disease, February 10-12, 1976.

We are always pleased to be responsive to the needs of the Task Force and the report copies were dispatched for the use you specified.

Let me repeat, however, the concerns I expressed earlier, namely, that NIOSH is not in full agreement with all the material presented. The report contains a number of omissions, factual inaccuracies, and statements inconsistent with current NIOSH recommendations for exposure to specific agents. Recent OSHA and NIOSH proposals are not mentioned in the corresponding sections on disease-producing agents. The report does not emphasize the special problems associated with carcinogens-including the probability that for many substances threshold exposures do not exist-nor does the report reflect the extent of NIOSH concern for the special problems of women in the workplace. The report is currently undergoing a critical review within NIOSH and we may anticipate a significant revision of the final draft prior to publication and distribution.

We believe that a handbook of this type would be helpful to agencies and individuals concerned with the compensation aspects of occupational disease, and you may be assured that all comments and suggestions for improvement of such a guide will be welcomed by NIOSH staff responsible for developing the final publication.

Marilyn K. Hutchison

Marilyn K. Hutchison, M.D.

CONTENTS

<u>Section</u>	<u>Page</u>
ABSTRACT	iv
1. GENERAL INFORMATION REGARDING DETERMINATION OF OCCUPATIONAL DISEASE	1
CHAPTER I. INTRODUCTION	1
The Decision-Maker's Dilemma	1
Exposure and Probability	2
Steps in Decision-Making	2
CHAPTER II. CASE HISTORIES	11
Occupational Disease Case History	11
Nonoccupational Disease Case History	15
CHAPTER III. EXPERT TESTIMONY	22
Medical	22
Industrial Hygiene	23
Environmental Exposure Evaluation	24
CHAPTER IV. AGGRAVATION OF PREEXISTING CONDITIONS	26
Problems in "Aggravation"	27
Solutions	31
2. GUIDES FOR 15 SPECIFIC AGENTS	33
Antimony and Its Compounds (Except Stibine)	33
Inorganic Arsenic (Excluding Arsenical Gases)	39
Asbestos	48
Benzene	55
Beryllium	62
Carbon Monoxide	68
Chromic Acid	74
Coke Oven Emissions	79
Cotton Dust	84
Inorganic Lead	90
Nitrogen Dioxide	99
Noise	105
Silica	114
Sulfur Dioxide	123
Toluene Diisocyanate	129

CONTENTS (CONT'D.)

<u>Section</u>	<u>Page</u>
APPENDICES	135
A. BIOLOGICAL CHARACTERISTIC DATA	135
B. SAMPLE RESPIRATORY QUESTIONNAIRE AND ILO U/C 1971 INTERNATIONAL CLASSIFICATION OF RADIOGRAPHS OF THE PNEUMOCONIOSES	141
C. OCCUPATIONS WITH POTENTIAL EXPOSURES TO DISEASE-CAUSING AGENTS	150
D. REFERENCES FOR TOXICOLOGICAL DATA	196
E. GLOSSARY OF TERMS	235

ABSTRACT

This guide presents a general method for assembling and evaluating medical and environmental data to assist state workers compensation personnel and other interested persons in deciding whether or not a disease condition is of occupational origin. In addition, specific data is given for 15 specific disease-producing agents including the following:

antimony	coke oven emissions
arsenic	cotton dust
asbestos	lead (inorganic)
benzene	nitrogen dioxide
beryllium	noise
carbon monoxide	silica
chromic acid	sulfur dioxide
	toluene diisocyanate

The guide discusses the reasons for the difficulty of making decisions regarding the relationship of disease to occupation. It contains the major steps in gathering and evaluating data and comparing it to criteria for decision-making. Detailed considerations are included covering medical, personal, family and occupational histories, clinical evaluation, signs and symptoms of occupational diseases, laboratory tests, epidemiological data, industrial hygiene sampling and evaluation data, and established standards for exposure to occupational disease-producing agents.

Examples of occupational and nonoccupational disease evaluations are given.

A discussion of aggravation of pre-existing conditions is given including examples of such conditions, and the legal and medical problems associated with decision-making regarding compensability of such conditions. Recommendations for approaching the problems are given.

Guidelines for assessing the qualifications of medical and industrial hygiene personnel who may present testimony regarding compensability of disease conditions is also presented and discussed.

Normal values for various biological tests and variables are given, including specific standards for biological monitoring for specific disease agents.

A sample questionnaire for evaluation of respiratory symptoms is given, and a chart of the ILO U/C 1971 International Classification of Radiographs of the Pneumoconioses is included.

A listing of occupations with possible exposure to the 15 specific disease-causing agents is given.

References giving toxicological data for the 15 specific disease-causing agents are abstracted. A bibliography of medical and industrial hygiene references is also given.

OCCUPATIONAL DISEASE--
A GUIDE TO DECISION-MAKING

SECTION 1. GENERAL INFORMATION REGARDING
DETERMINATION OF OCCUPATIONAL DISEASE

CHAPTER I. INTRODUCTION

THE DECISION-MAKER'S DILEMMA

Establishing the exact cause of disease is often a difficult matter. The difficulty is compounded when it is necessary to decide if an employee's disease resulted from or was aggravated by employment; this cause-effect relationship between the disease and an agent in the workplace may not be clear. Factors that need not be considered when an injury is of a traumatic nature may assume great significance when the decision concerns disease, especially occupational disease.

For example, an employee's previous work experience is seldom relevant in concluding that finger amputation occurred as a result of equipment malfunction. In determining work relatedness of disease, however, documentation of exposure to a toxic substance in a previous job over a known period of time may be the specific evidence required to establish that the person's disease arose out of his employment.

Traumatic injuries are usually readily apparent. They quickly disrupt the employee's working procedures, personal well-being and the flow of work in the place of employment. Occupational diseases, on the other hand, may be slow to develop and may be confused with other effects such as changes that accompany the aging process, the effects of smoking or alcohol abuse, and hereditary factors. Furthermore, not all individuals react in the same way to similar exposures of disease-producing agents. In a group of workers in the same environment, perhaps only one may develop an occupational disease. This would be unusual, but it is possible.

In the workers compensation system the final decision that a disease or traumatic injury is of occupational origin and is compensable is a legal decision. The individual charged with making this legal decision must base it upon the evidence available to him. When such evidence is inaccurate, inappropriate, or incomplete, inequitable decisions are bound to occur. However, when medical, environmental and other evidence is correctly assembled and presented clearly and logically, the decision-making process is greatly simplified. The decision is more likely to be based on an evaluation of the factual issues in the case.

How does the decision-maker know which evidence is vital and significant and which is irrelevant or even misleading? How does the physician, industrial hygienist or legal counsel know what data should be included in his presentation? This guide is an attempt to define step-by-step methods of collecting, organizing, and evaluating evidence for the purpose of aiding the decision-making process, in claims concerning occupational disease. However, this document does not establish a mandatory process for making these decisions.

EXPOSURE AND PROBABILITY

In most cases, the degree of exposure (in terms of quantity and time) to an occupational disease-producing agent should be greater than some minimum for disease to occur. However, it is possible in isolated cases for an individual to react to a greater degree than most people, and develop disease from an otherwise acceptable exposure. The degree of exposure to a disease-causing agent effects the probability of the agent actually causing disease.

Standards of exposure for many agents have been established. Exposure in excess of a standard, coupled with the existence of a disease associated with the agent, constitutes nearly certain evidence for a decision that the agent caused the disease. An exposure far below the standard, for example less than 10 percent of the standard, but greater than zero, strongly indicates that the agent is not the causative factor. However, there are too many unknowns to assign numerical probabilities in any specific case. The best that can be done is to define decisions within a rather loose framework of reference: "unlikely," "possible," "probable." Data that will be found valuable in this regard is given in the guides for specific agents (Section 2), and Appendix D.

The decision-making process consists of compiling information regarding the worker and his job duties in order to judge the exposure and probability factors with the greatest possible certainty. It will not always be possible to arrive at a clear-cut decision; however, in most cases it will be. The most difficult decisions will be those dealing with aggravation of a condition which occurs in the nonworking population or exists prior to current employment. This is discussed in Chapter IV.

STEPS IN DECISION-MAKING

1. Medical evaluation--

- A. Analyze the employee's medical, personal, family and occupational histories.
- B. Make a thorough physical examination and clinical evaluation (analyze all signs and symptoms).

C. Conduct a complete laboratory evaluation (analyze the results of specific tests).

2. Epidemiology -- collect and consider the experience of other workers with the same work exposures.
3. Exposure evaluation -- determine the importance of environmental exposures to disease-causing agents.
4. Conclusion -- reach a decision whether or not the worker's disease is occupational.

A disease is occupational if:

1. There exists in the worker's occupational environment (past or present) exposure to an agent or agents sufficient to have caused the disease; and
2. The medical findings of disease are compatible with the effects of the disease agent or agents to which the worker has been exposed.

If these conditions are met in a given case, the logical conclusion is that the disease is occupational.

The following discusses information which should be gathered to reach a soundly based decision. In cases of supposedly obvious occupational or nonoccupational disease, it may be tempting to make a quick decision. With occupational disease, however, what is "obvious" is often subject to controversy, and it is important to assemble complete information in order to make a correct decision. These information-gathering and analysis steps are not unique to worker's compensation cases. Occupation is a factor which should always be a part of all diagnostic procedures.

The Medical Evaluation

medical history

In order to correctly determine the origin of illness, the worker's past medical history must be evaluated by the physician. The factors in the medical evaluation regarding past medical history are the following, including the date of each occurrence:

1. all previous illnesses from birth to present
2. childhood, physical and mental illnesses
3. injuries
4. surgical procedures

5. hospital confinement
6. details specific to a suspected causative agent
(see specific guides, Section 2)

Personal history

In addition to the above items concerning past medical history, the employee's personal and family history should also be evaluated by the physician. The following should be considered:

1. age and sex
2. marital status and number of children
3. sleeping habits
4. name and location of all places of residence since birth
5. alcohol and tobacco use (how much and how long)
6. recreation and hobbies
7. areas visited prior to onset of symptoms
8. medications or drug use (past and present)
9. details specific to a suspected causative agent
(see specific guides, Section 2)
10. The use of chemicals in the home, such as cleaning agents, aerosol products, etc.

Family history

ascertain the following about the worker's close relatives and people with whom the worker lives:

1. age
2. sex
3. health status
4. note especially any history of chronic or occupational disease in the family, or in persons with whom the worker lives

Occupational history

the employee's complete occupational history including military

service is also necessary in determining the origin of illness, particularly if the disease may result wholly or in part from previous occupations. The following factors regarding present and past occupations should be evaluated by the physician:

1. job title
2. type of work performed -- complete listing of actual duties performed
3. length of time during which each type of activity took place
4. dates of employment and worker's age during each period
5. physical and geographical location of employment
6. product or service produced
7. condition of personal protective equipment used, if any, and frequency and duration of periods of use
8. nature of agents or substances to which the worker is or has been exposed including the frequency and average duration of each exposure situation (also see Disease Agent Exposure - Occupational, page 6.)

The Clinical Evaluation

1. routine examination of all physiological systems:

neck	head
eyes	ears
nose	throat
skin	endocrine
neurological	respiratory
musculo-skeletal	cardio-vascular
genito-urinary	gastro-intestinal
2. behavior related to emotional status should be observed and evaluated
3. specific examination for health effects of suspected or possible disease agents (seek competent medical consultation)
4. date of onset of symptoms and progress as compared to occupational history
5. results of any past biological or medical monitoring performed such as blood, urine or other sample analysis, and previous physical examinations

The Laboratory Evaluation

1. routine examination:
 - a. complete blood count
 - b. blood chemistry profile (SMA-12)
 - c. urinalysis
2. specific tests for suspected or possible disease agents (seek competent medical consultation)
Examples:
 - a. blood or urine examination for specific agent
 - b. X-rays
 - c. lung function tests

Epidemiology (experience with groups of humans)

Review health experience of groups of workers exposed to the agents involved in the specific case.

Disease Agent Exposure -- Occupational (for each job and duty)

1. consider substances handled, used, or used in operations in nearby areas
2. any Industrial Hygiene studies available, especially air sampling data, for the job or similar jobs.
(See specific guides, Section 2, and Expert Testimony, page 22.)
3. data to be accumulated for work exposure evaluation:
 - a. inhalation exposure information -- expert testimony should be obtained concerning general environmental conditions, especially when there are no industrial hygiene studies available as evidence

expert testimony should include reference to at least:
 - (1) establishing the precise chemical or physical form of the agent (terms such as "dust," "chemicals," etc., are not precise)
 - (2) a complete description of the operation as performed by the worker including

- materials handling practices, accessory equipment, operating procedures and protective equipment
- (3) information on the particle size of the agent (for dusts) generated by the operation in question
 - (4) information about the solubility of the agent affecting absorption by the body
 - (5) possible additional modes of entry of the agent into the body (ingestion, skin absorption)
 - (6) available ventilation:
 - (a) was general exhaust ventilation provided?
 - (b) was local exhaust ventilation provided?
 - (c) was it properly designed?
 - (d) was it installed to design specifications?
 - (e) was it properly maintained?
 - (f) was it properly used by operator?
 - (g) was contaminated exhaust air recirculated into the plant?
 - (7) general housekeeping:
 - (a) was dry sweeping done?
 - (b) were spills cleaned up properly?
 - (c) was equipment properly maintained and serviced?
 - (d) were all plant areas regularly cleaned?
 - (e) were materials stored properly to prevent spills or leaks?
 - (8) respiratory protection -- while respirators are not the most preferred

method of protecting workers from inhalation of airborne toxic agents, they are sometimes used until other controls can be installed. They must be used properly to fulfill this function, and testimony directed toward this point should be elicited:

- (a) was the proper type of respirator used? It should have been selected by an industrial hygienist for the specific agent involved. It should also have been approved by NIOSH or the Bureau of Mines
 - (b) were the respirators fitted properly? Face shapes and facial hair often cause leaks in the facepiece, negating the effectiveness of the respirator
 - (c) did employees use the respirators?
 - (d) were cartridges, filters, etc. changed at the appropriate intervals?
 - (e) were employees trained in the proper use, purpose and care of respirators?
 - (f) were the respirators periodically inspected and maintained?
- b. skin contact, skin absorption, and ingestion--evidence should include at least information regarding:

(1) potential for skin contact

- (a) was the operation a "closed system"?
- (b) was personal protective clothing used?
- (c) was the proper type supplied?
- (d) was it used properly?

- (e) was it laundered properly?
- (f) were change rooms available?
- (g) were protective skin cremes used?
- (h) were emergency washing facilities available?

(2) potential for ingestion --

- (a) was smoking permitted in the work area?
- (b) were smoking materials permitted in the work area?
- (c) was eating permitted in the work area?
- (d) was food stored or prepared in the work area?
- (e) were there separate facilities for storing food and eating?
- (f) were there proper washing facilities?

Validating Medical and Industrial Hygiene Information

It is not expected that lay persons will be able to amass and evaluate all of the information on the previous pages. In most cases, professionals such as physicians and industrial hygienists will testify regarding the existence of an occupational disease. These professionals must consider all of the foregoing to arrive at a just and equitable decision. The hearing examiner, board, commissioner, or officer should verify the following factors:

1. the professional qualifications of those testifying (see Expert Testimony -- Industrial Hygiene, and Expert Testimony -- Medical, pages 22 and 23).
2. the basis of the testimony, by asking if they considered all of the points mentioned in the previous pages and what conclusions were drawn.

Conclusion

The above information will, in the majority of cases, increase the probability of a sound decision regarding whether or not a disease is occupational. The two case histories in Chapter II are examples of how this information is used. The most significant factor to remember is that all of the above items of information should be assembled and examined by competent professionals, asking at each point, "Does this confirm the two points which establish existence of occupational disease?" The omission of any factors may lead to an inaccurate conclusion.

CHAPTER II. CASE HISTORIES

This section contains two detailed examples of investigation of occupational disease claims, illustrating the application of the decision-making process. To illustrate the types of situations which may arise, the following brief examples are offered:

1. An obvious occupational disease--

A disease which occurs commonly in the workplace and a confirmed history of exposure to an agent causing the disease. Medical examination, X-ray, and lung function tests indicate probable silicosis, a disease of the lungs caused by inhalation of dust containing the mineral silica. The worker's past and present job: hard-rock miner. Evidence is presented showing dust exposures in the mine in which he works and at his job are in excess of current standards. There is no question that this is an occupational disease.

2. An obvious nonoccupational disease--

A disease occurring commonly in the general population, with no occupational agent exposure. Medical examination and laboratory tests diagnose tuberculosis. The worker's past and present job: filing clerk. Investigation shows no other cases of tuberculosis in the office where the worker is employed. This is clearly a nonoccupational disease.

3. A possible occupational disease and an unknown exposure--

A worker has an anemia and is employed as a spray painter. If the anemia is an aplastic anemia, it could be caused by exposure to benzene, a solvent that may be present in some paints. Both the exact type of anemia and the chemical content of the paints used must be investigated to make a decision.

To illustrate this type of situation, where decision-making is more difficult, the following two case histories are offered:

OCCUPATIONAL DISEASE CASE HISTORY

Complaint: Malaise, increasing fatigue and "pins and needles" sensation in the feet.

Medical Evaluation

Evaluation of complaint: Past few days noticed a "pins and needles" sensation in his feet and some weakness of the lower legs. For several weeks or longer he has generally felt weak and tired and not himself. In general he has not been feeling well for quite some time. He has had some weight loss but has not been eating well because of lack of appetite. For a time he has had intermittent periods of nausea and vomiting, but they "come and go." Insomnia and rather frequent headaches have been occurring. Remaining systemic review is negative.

medical history

General health has always been good. Tonsils and adenoids removed as a child; usual childhood diseases; occasional colds but nothing serious.

Personal history

Age 36, white male, married with children, boy 13 and girl 11. Drinks 8 to 10 ounces of alcohol a day and smokes one pack of cigarettes a day. Lived all his life in Brooklyn, New York. Graduated from high school at age 18. Mother and father and two siblings living and well--mother has diabetes. As a hobby he gardens and has many house plants, but does not use insecticides.

occupational history

Present occupation: Handyman--works with five other people in a small shop where arts and crafts are made. The work entails mixing pigments and dyes used in printing textiles and for coloring enamels and glazes; generally keeps the shop clean and in order.

Previous occupations: Took two courses of arts and crafts, pottery-making and glazing in high school. Worked part-time as a grocery clerk while in school. After graduation worked for five years as a ship cutter; exposed to lead, asbestos and iron oxide.

Building superintendent, two years. No known exposures to agents but perhaps some polishes, detergents and disinfectants.

Painter, four years. Exposed to pigments found in paint such as lead, chromium and arsenic.

Gardener, three years. Exposed to insecticides and weed killers. Knows that some had pyrethrums, arsenic and parathion-like substances in them.

Present job, four years. Some of the pigments he mixes contain nickel, lead, arsenic, iron and other chemicals. He cleans

with a vacuum cleaner, wears no protection and there is some dust.

He has no secondary job.

Clinical Evaluation

The examination revealed a well developed male who appeared tired. His face was pale and the skin over the trunk appeared somewhat pigmented. Examination of the head, eyes, ears and throat showed them to be normal. The nasal septum was inflamed. No adenopathy. The thyroid was normal. Chest expanded symmetrically and percussion and auscultation were normal.

The pulse was 78 and regular, the blood pressure was 128/82. Heart sounds were normal and no evidence of enlargement. There was slight tenderness on palpation of the right upper quadrant but the liver edge was not palpable.

External genitalia was normal. Peripheral circulation was normal. On examination of the extremities a hyperkeratosis of the palms of the hands and soles of the feet were found. There was decreased sensation to touch and vibration in the feet. Patella and ankle reflexes were decreased; those of the wrist and elbow were normal.

Laboratory Evaluation

CBC and Differential:	RBC 4.0 million/cubic mm
	Hb. 12 g/100 ml
	Hct. 40 percent
	WBC 4,000 per cubic mm
Chest X-ray: 14" x 17" -	Normal
Electrocardiogram:	Normal
SMA-12:	Normal
Urinalysis:	Normal
Thyroid function tests:	Normal
Blood Lead: 0.03 mg/100 gms	
Urinary Arsenic: 0.9 mg/liter	

Epidemiological Findings

The workplace was surveyed (see Table 1). It was found that the atmosphere contained levels of arsenic in excess of the Occupational Safety and Health Act (OSHA) standards. At breathing level, where the patient worked at mixing the pigments, arsenic levels often were much too high. Dust on the floor and walls contained arsenic and when cleaning, larger than recommended amounts of airborne arsenic were found. Even though pigment containing arsenic was not mixed daily, there was cumulative exposure.

The literature contains ample evidence to indicate that such exposure to arsenic dust could produce arsenic intoxication.

TABLE 1

ATMOSPHERIC METAL DUST AND FUME CONCENTRATIONS

October 1, 1975
 ABC ARTS & CRAFTS
 ANYTOWN, U.S.A.

SAMPLE NUMBER	L O C A T I O N	TIME START/ STOP	RESULTS IN MILLIGRAMS PER CUBIC METER OF AIR			
			ARSENIC	NICKEL	LEAD	CHROMIUM
OSHA ALLOWABLE LIMITS			0.5	1	0.2	0.5
<u>Operator's Breathing Zone:</u>						
1	John Doe - General Work in stockroom and weighing pigments.	0700/ 0900	0.47	< 0.001	< 0.001	< 0.001
2	John Doe - Weighing and mixing pigments.	0900/ 1100	1.33	< 0.001	0.021	0.007
3	John Doe - Mixing and packaging pigments; 30 minute lunch.	1100/ 1300	1.21	< 0.001	0.050	0.042
4	John Doe - Plant cleanup.	1300/ 1500	0.75	< 0.001	0.027	0.003
Time-Weighted Average Exposures:			0.94	< 0.001	0.025	0.013
< Denotes less than.						

< Denotes less than.

It can be clearly seen from Table I that the employee's exposure to arsenic was the only exposure evaluated which exceeded the allowable limit (in this case nearly twice the permitted exposure). Exposures to nickel, lead, and chromium were well within the eight hour time-weighted average limits and continued exposure at the levels evaluated should not result in any health hazards.

Contaminants in the Work Environment

From Reference 7, Appendix D, we find that hyperpigmentation has been reported among employees exposed to arsenic concentrations ranging from 0.110-4.038 milligrams per cubic meter of air (0.562 milligrams per cubic meter was the mean exposure). This would conform with the clinical evaluation in this specific case where the average exposure to arsenic was 0.94 milligrams per cubic meter of air and hyperpigmentation was observed.

Laboratory findings indicated absorption of arsenic by urinary arsenic levels of 0.9 milligrams per liter. Toxicological data would also imply increased urinary arsenic levels at the atmospheric concentrations evaluated as indicated by the report of an average urinary arsenic level of 0.23 milligrams per liter in workers exposed to mean air concentrations of 0.562 milligrams arsenic per cubic meter.

Conclusion

The differential diagnosis would include lead poisoning, hypothyroidism, anemia and chronic arsenic poisoning; the laboratory findings rule out lead poisoning and hypothyroidism and indicate an absorption of arsenic. Anemia would not account for all of the symptoms and could be part of the pathology of arsenic intoxication.

The history of the complaint, the symptoms and signs along with the laboratory information and the abnormal exposure to arsenic in the workplace, and no evidence of nonoccupational exposure make the diagnosis of chronic arsenic intoxication, occupational in origin.

NONOCCUPATIONAL DISEASE CASE HISTORY

Complaint: Cough of five years duration and shortness of breath.

Medical Evaluation

Evaluation of complaint: About five years ago started to notice a cough that seems to occur during sleeping and at work. He may awaken and raise a mouthful of white, clear sputum. There is no cough on arising in the morning but during the course of the day may bring up 1 to 2 mouthfuls of white sputum--never colored or blood streaked.

He has no dyspnea but states that he does become aware of shortness of breath after climbing 7 or 8 stairs. He can walk 2 or 3 flights slowly but without stopping.

He sleeps without a pillow and has no swelling of the ankles. There is no chest pain or wheezing. He has no history of allergy and there are no other symptoms. The rest of the systemic review is noncontributory. He has never sought medical attention for the cough or shortness of breath during the five years that he has been aware of it.

medical history

General health always has been good. Tonsillectomy and adenoidectomy at age 7. Usual childhood diseases, no accidents or serious illnesses. He received \$2,000.00 from a previous employer for dermatitis of the hands (Workers Compensation Insurance). The cause of the dermatitis was never determined nor has it recurred.

personal history

Age 40, white male, married with one son age 20. Lived in Pennsylvania all his life except while in the Navy when he was stationed in New York. Drinks an occasional beer, never smoked in any form. He quit high school at age 15 after two years. Mother age 62, father age 63, and a brother age 42; all living and well.

occupational history

Present occupation: Foreman in a warehouse; warehouse adjacent to operation where paper towels, napkins and toilet tissue are printed. Duties consist of general supervision of the warehouse. Exposure to paper dust and ink and oil mist as well as exhaust from trucks at shipping platform.

Previous occupations: Age 14-16, sold newspapers (1949-1951).

Age 16-19, worked as a printer in a printing shop; in contact with paper dust and ink (1951-1954).

Age 19-21, Navy--stationed in New York and worked as a cook. No contact with any hazardous materials except some smoke from cooking (1954-1956).

Age 21-30, warehouseman in charge of ticketing--directing correct merchandise to proper retail stores. In contact with dust and some exhaust from trucks (1956-1965).

Age 30-40, present job--foreman in warehouse operation. The company makes and prints paper towels, napkins, toilet tissue, etc. Warehouse is adjacent to printing operation. There is some paper dust, ink and oil mist as well as exhaust from trucks.

He has no secondary occupation.

Clinical Evaluation

Examination revealed a white male, somewhat overweight, in no acute distress. Skin and hair appear normal. Neck veins not prominent, no cervical adenopathy. No abnormalities of ears, eyes and throat. Nasal septum deviated to the right. Chest is clear to percussion and auscultation. No murmurs or enlargement--A2 = P2. Blood pressure 180/120 right arm; 170/110 left arm. PMI within midclavicular line. Abdomen--no masses or organs palpable. Slight tenderness in left lower quadrant on deep palpation. Right testicle not palpable, inguinal rings firm. No clubbing of the fingers. Small varicosities on left lower leg. No ankle edema. Axillary and inguinal nodes not enlarged. Rectal examination reveals a normal prostate, no masses or other abnormalities palpable. Height 5'9"; Weight 180 lbs.

Laboratory Evaluation

Chest X-ray:	Heart size within normal limits; lung fields clear. Negative.
FVC and FEV:	(Repeated 3 times) within normal limits.
SMA-12:	All chemistries normal.
CBC and Differential:	Normal

Epidemiological Findings

There is no evidence in the scientific literature to indicate that working in this environment is hazardous. Others in the work area also have occasional coughs--some with clear sputum production. These men all have negative clinical and laboratory findings. Epidemiological evidence does exist to show that over 20 percent of the male and 9 percent of the female working population over 25 years of age in the United States have a chronic bronchitis (1970. N.E.J. Med. 270:894).

Contaminants in the Work Environment

The workplace was surveyed in 1973 (Table 2, a, b, c). Potential exposures are well within the allowable OSHA limits. The toxicity of carbon monoxide is well known, however, the levels of exposure in this case are far below toxic limits. Oil and ink mist have not been demonstrated to cause specific disease entities. With very high concentrations animals have developed a chemical pneumonitis. Paper dust has not been found to be toxic, and is considered a nuisance dust.

TABLE 2 (a)ATMOSPHERIC OIL MIST PARTICULATE CONCENTRATIONS

October 10, 1973

XYZ VARIETY STORES
SOMETOWN, NY

<u>SAMPLE NUMBER</u>	<u>LOCATION</u>	<u>TIME START/STOP</u>	<u>RESULTS AS MILLIGRAMS PER CUBIC METER OF AIR</u>
OSHA ALLOWABLE LIMIT			5.0
<u>Operator's Breathing Zone:</u>			
1	Jack White - performing normal duties.	0500/1000	0.25
2	Jack White - performing normal duties.	1000/1200	0.10
3	Jack White - performing normal duties.	1200/1400	1.2
4	Jack White - performing normal duties.	1400/1600	0.55
Time-Weighted Average Exposure			0.52

TABLE 1 (b)ATMOSPHERIC PAPER DUST CONCENTRATIONS

October 10, 1973

XYZ VARIETY STORES
SOMETOWN, NY

SAMPLE NUMBER	LOCATION	TIME START/STOP	RESULTS AS
			MILLIGRAMS PER CUBIC METER OF AIR
OSHA ALLOWABLE LIMIT (Nuisance Particulates)			15
<u>Operator's Breathing Zone:</u>			
1	Jack White - performing normal duties.	0800/1200	2
2	Jack White - performing normal duties.	1200/1600	1.5
Time-Weighted Average Exposure			1.75

TABLE (c)

ATMOSPHERIC CARBON MONOXIDE CONCENTRATIONS

October 10, 1973

XYZ VARIETY STORES
SOMETOWN, NY

SAMPLE NUMBER	LOCATION	TIME START/STOP	RESULTS AS PARTS PER MILLION
OSHA ALLOWABLE LIMIT			50
<u>Operator's Breathing Zone:</u>			
1	Jack White - Paperwork at desk.	0810/0817	5
2	Jack White - Operating LPG Fueled Lift Truck.	0842/0849	20
3	Jack White - Loading platform (all docks filled with trucks).	0955/1002	10
4	Jack White - Same as 3	1131/1138	5
5	Jack White - Working approx. center of whse.	1159/1206	5
6	Jack White - Paperwork at desk.	1310/1317	< 5
7	Jack White - Approx. center of Printing Dept.	1418/1425	< 5
8	Jack White - Operating LPG Fueled Lift Truck.	1430/1437	40
9	Jack White - Same as 8	1501/1508	25
10	Jack White - Working approx. center of whse.	1547/1554	<u>10</u>
Approximate Time-Weighted Average Exposure			13

< Denotes less than.

Conclusion

In the face of normal X-ray and pulmonary function studies with no abnormal lung findings on clinical examination, normal blood count and blood chemistries, no adverse epidemiological or toxicological evidence and the ambient work environment well below the recommended levels, this case must be considered non-occupational in origin. There is no evidence to indicate that the worker's symptoms are occupational in origin.

He does, however, have hypertension. Sleeping flat and awakening to expectorate may signify a very early stage of hypertensive heart disease, and some orthopnea would be expected. Having symptoms for five years without ever seeking medical attention seems unusual. The conclusion in this case is that the disease is not bronchitis, but hypertension, and is nonoccupational.

CHAPTER III. EXPERT TESTIMONY

MEDICAL

The phrase "competent medical person" is frequently used in both the lay and professional literature, including this guide. But what does it mean? Who is a competent medical person? No rigid rules for judging can be defined for there are too many variables and too many different situations where they may apply. Some guidelines can be developed to aid the lay person in knowing who is or might be considered a "competent medical person."

A competent medical person is one trained in one of the several disciplines of medicine and intimately acquainted with the work environment involved. The person should also be specially trained in the particular expertise in which the testimony is to be presented.

A competent medical person need not be a physician. One might be a Doctor of Osteopathy, a dentist or a registered nurse. A physiologist, an anatomist, a toxicologist, or an industrial hygienist under certain circumstances may be considered a competent medical person.

A medical specialist such as an internist, pathologist, surgeon, a specialist in chest diseases or an occupational health physician is a competent medical person--but not in all instances. For example, in a compensation case involving a question of lung disease, the chest disease specialist can use his or her expertise in diagnosis. But if he or she is not familiar with the work and exposure of the employee, or does not have the background to coordinate and properly evaluate industrial hygiene, toxicological and epidemiological information, then he or she is not medically competent to give an expert opinion as to whether the disease is occupational or nonoccupational in origin. A physician who is an expert in the field of Occupational Health would be more competent to make the decision. It is possible that the same physician may work in both specialties. If not, then two different people may be needed to provide the expert opinion.

A competent medical person need not be a diplomate or so called "board certified" specialist or an academic professor.

Because one is an expert in a specific medical field does not mean he or she is medically competent to render judgment on an entire case, only on that portion of it which is within his or her expertise. Moreover, the medically competent person should be impartial and have an understanding of labor and industry. The medically competent person may be qualified to judge degree of impairment, but not disability, which is a legal decision.

It is the duty and responsibility of a compensation hearing officer, lawyer or any interested person to be aware of the requirements for medical competency to avoid unsound decisions.

The following should be considered in judging medical competence:

1. Is the physician Certified in Occupational Medicine by the American Board of Preventive Medicine?
2. Is the medical expert's area of specialty directly related to the disease in question (Cardiologist for heart disease, chest specialist for lung disease, etc.)?
3. Does the medical expert have industrial experience? In what industries?
4. What is the medical expert's experience in occupational or environmental health and in evaluating and diagnosing diseases of the type in question?
5. What is the extent of the person's formal training in occupational or environmental health?

INDUSTRIAL HYGIENE

Whenever available, reports of past industrial hygiene studies applicable to the case in question should be relied upon to provide basic environmental evidence. To be credible, personnel conducting industrial hygiene studies for use as evidence (as well as all industrial hygienists consulted) should be professionals trained in the discipline of Industrial Hygiene, or be under the direction of such professionals.

According to the American Industrial Hygiene Association, a professional industrial hygienist "is a person, possessing either a Baccalaureate Degree in Engineering, Chemistry, or Physics or a Baccalaureate Degree in a closely related Biological or Physical Science from an accredited college or university, who has, in addition, a minimum of three years of Industrial Hygiene experience. A completed Ph.D. or Sc.D. in a related Physical or Biological Science or an M.D. can be substituted for two years of the three year requirement." Further, it is suggested that all industrial hygienists consulted be professionally certified by examination by the American Board of Industrial Hygiene.

The following should be considered when judging industrial hygienist's competence:

1. Is the industrial hygienist Certified by the American Board of Industrial Hygiene, or under the direction of a Certified Industrial Hygienist?

2. Is the area of specialty of Certified Industrial Hygienists related to the evidence being given (comprehensive, engineering, toxicology, acoustics, air pollution, chemistry, radiology)?
3. Does the industrial hygienist have experience with the particular occupation involved?

ENVIRONMENTAL EXPOSURE EVALUATION

The best evidence to confirm the exposure of a worker to an agent are measurements, such as air samples, noise levels, or radiation measurements obtained at the worker's actual job station. Factors which should be considered when evaluating these measurements are:

1. Number of samples (or duration of time covered by samples)--In most cases, a few (two or three) air samples covering only a small portion of a working day are not sufficient to establish degree of exposure. Generally, samples or measurements should be obtained covering most of a complete work day; covering several nonconsecutive work days is even better. For very short duration samples or readings (less than 15 minutes each), a minimum of seven samples, spaced randomly over the work day, should be obtained.
2. Location of samples--The best location for sample taking is in the breathing zone (within a few inches of the mouth and nose) of the employee or a worker doing an identical job to that of the employee, under conditions identical to those under which the employee worked. Samples obtained at a stationary point in the work environment (area samples) can give an indication of possible exposure, but may be very misleading. For example, measuring noise levels a few inches from a noisy machine when the worker is located several feet away may indicate erroneously high exposures. Obtaining air samples for a solvent at the center of a room, when the worker must lean into a solvent tank, would indicate exposures much lower than those which actually exist.
3. Air sampling method--The methods mentioned in this guide are those commonly used or accepted in the Industrial Hygiene profession. Other methods may exist and give accurate results, however, expert opinion should be obtained concerning their validity. All equipment used should be accurately calibrated.
4. Laboratory analysis--Analysis of air samples is a difficult science, and should be done by experienced, competent professionals. It is suggested that

laboratories accredited by the American Industrial Hygiene Association be used for these analyses, and that the laboratory's previous experience with the specific type of analysis be ascertained. Certification of laboratory staff in Industrial Hygiene Chemistry by the American Board of Industrial Hygiene is another indication of professional competence.

CHAPTER IV. AGGRAVATION OF PREEXISTING CONDITIONS

In the area of occupational disease, there is no generally accepted medical definition of aggravation. Within the existing workers compensation system, aggravation of a preexisting disease or physical impairment may be defined as any occupational occurrence, act, or exposure that will make worse, intensify, or increase in severity or seriousness any physical, mental, or emotional problem known to exist before the occupational exposure. An example would be an individual with known allergies developing an allergy to substances in the workplace resulting in frequent asthmatic attacks. Another example would be a recovered alcoholic with mild liver damage, who is exposed to carbon tetrachloride at work, resulting in greater liver damage.

This definition of aggravation implies that if there is any occupational contribution to a disease, the disease is compensable. This is a legal decision resulting from legislation and past court decisions, and is not the subject of this guide. The guide is concerned with the medical aspects of causation of disease, and whether or not the causes are occupational.

Given the lack of an accepted medical definition of aggravation, it is difficult to reach any conclusions about aggravation of preexisting conditions by occupational agents. A medical definition of aggravation, should imply answers to the following types of questions:

Does aggravation apply only to conditions known to exist before employment? Or, can a condition which arises during employment, from nonoccupational agents, also be aggravated and be compensable? An example of this would be a case of chronic bronchitis caused partly by smoking and partly by exposure to pulmonary irritants at work. This is an especially difficult problem if neither agent was sufficient in itself to cause the disease.

Is a disease state that is exacerbated by work, with eventual remission, a case of aggravation? Or should only permanent impairment due to occupation be considered aggravation? An example of this problem would be an arthritic worker who is unable to perform his job because it requires the use of his fingers. The job exacerbated the arthritic condition, however, upon leaving this job the worker is able to perform another job without impairment because the job does not require extensive use of the fingers.

Should emotional factors, such as stress, be considered aggravating agents? If so, how are their effects to be measured? An example would be hypertension which may

be worsened by stress on the job.

PROBLEMS IN "AGGRAVATION"

Table 3 lists some agents which may contribute to disease and aggravation of disease.

Since most states hold that the employer accepts the worker "as is," such factors as age, sex, heredity, and obesity can be logically excluded from the list of causative factors. This leaves only those environmental factors, such as exposure to toxic materials, which may occur at work or in the nonworking environment, as candidates for discussion of the "cause" of an aggravated disease or condition.

This consideration appears to lead to a very straightforward decision-making scheme to weigh the "percent contribution" of various factors in a specific case, and award compensation on a contributory basis. Unfortunately, no such simple approach is possible.

Aggravation cases frequently have multiple causes, not all of which are known, and most of which are poorly understood.

A baseball pitcher with a painful shoulder is a clear-cut case of a condition which will be aggravated if the shoulder is used in pitching. This is an example of a case which will rarely be disputed in a compensation hearing, or ever require medical evaluation. The difficult and frequently unsolvable cases are those associated with the chronic diseases.

TABLE 3. CONTIBUTORY AGENTS

<u>Disease</u>	<u>Nonoccupational</u>	<u>Occupational</u>
1-cardio-vascular, including coronary occlusion	age heredity sex smoking diet obesity stress medication or drugs climate	various chemicals, solvents, gases pulmonary irritants unusual exertion stress temperature
2-hearing loss	age heredity noise impacted cerumen (wax) foreign body in ear canal ear infection nasopharyngitis medication or drugs trauma	noise foreign body in ear canal trauma nasopharyngeal irritants
3-arthritis or "rheumatism"	age heredity diet trauma infection obesity stress	repeated articular movement trauma cold, damp work environment improper lifting work-required poor posture
4-pulmonary diseases	age heredity sex smoking allergy air pollution infection climate	various dusts, gases, mists, etc. allergens wearing of respirators decreased oxygen supply temperature, humidity

The problem with chronic diseases is the number of parameters involved: age, sex, heredity, other diseases, emotional status, etc. The causes, course, and eventual outcome of these diseases are usually unknown and poorly understood. Studies of large groups of people help in assigning probabilities to understanding a disease (such as statistics giving increased incidence of heart attack or lung cancer for smokers), but such statistics are not of great value in judging the condition of a specific individual--and all compensation cases involve one individual.

As chronic diseases progress, they usually exhibit periods of worsening and improvement. The time of life when symptoms develop contributes to the complexity of the problem, since many start in middle age, but can occur in youth or old age (e.g., diabetes, arthritis, cardio-vascular disease).

Examples

The following help illustrate the problems discussed above:

A healed case of tuberculosis becomes an active case, in this example, while the worker is exposed to silica dust. The worker dies of tuberculosis. During the period of exposure to silica, silicosis was developing in the tubercular lungs. At autopsy, the cause of death is listed as tuberculosis. Would the tuberculosis have broken down and produced death without the silica dust exposure? In cases such as this, courts have decided both ways. Medically, it appears that the silicosis was a distinct disease, and by its action in the lungs allowed and may have encouraged or reactivated the tuberculosis. And yet, tuberculosis can develop without the presence of silica. In this case, the tuberculosis could be judged nonoccupational (unless it was contracted by exposure to a tubercular fellow-worker).

Arthritis is a disease almost universally present in the over-middle-age group, and can cause effects that range from a nuisance to severe incapacity. Certain abattoir workers are required to work in damp, cold conditions. Over the years, some of these workers develop arthritis that is disabling, but some escape it entirely. Are the work conditions responsible for the disabling arthritis? The courts have most often held that they are. However, since the causes of arthritis are unknown, these decisions are based on legal and administrative rulings.

Coronary artery disease is one of the most frequent "preexisting conditions" cited as being aggravated by work. Some feel that heart attacks should never be compensated, while others feel they should be, but have such complicated etiology that they should be removed from the Compensation System (National Commission on State Workmen's Compensation Laws, 1973. Compendium on Workmen's Compensation. Washington: GPO).

In addition to the commonly accepted factors such as age, heredity, smoking, diet, etc. some chemicals have profound effects on the heart and cardiovascular system. Aniline and nitrobenzene are myocardial depressants. Ethylene, chloroform, and trichloroethylene are myocardial irritants. The azides produce severe vasodilation. Carbon disulfide causes atherosclerosis. Carbon monoxide, cyanide, certain insecticides, can have profound effects on individuals with impaired cardiac function or reduced cardiac reserve. Pulmonary irritants such as ammonia, chlorine, phosgene, and sulfur dioxide can be quite hazardous to the individual with heart impairment. Pneumoconiosis produced by silica or asbestos can result in right heart failure. Heat, cold and electrical shock can have serious effects on the impaired heart.

Heart attacks do occur in the workplace. The frequency of such attacks is less than that of the general population, presumably because the worker spends less time at work than at home, and in addition, the American worker is "selected," i.e., he often receives pre-placement physical examinations to place him in a job which is compatible with his health and physical abilities. He may also receive periodic follow-up physical examinations at work to monitor his health.

One researcher (Paffenbarger) in work with longshoremen has demonstrated a "protective threshold effect" produced by heavy work. In a 20 year study, he reported that workers involved in heavy work had a sudden death rate of 5.6, those in moderate work a rate of 19.9, and those in light work a rate of 15.7. He found that in all categories, the longshoremen were sedentary when off the job, so physical conditioning away from work was ruled out. This study indicates that, perhaps, heavy work may help to prevent sudden death from heart attacks, rather than aggravating them.

A high number of heart attacks that occur at work do end up in litigation. In almost all of the cases that go to litigation the problem is that of causation. Determination of cause leads to the recitation of facts and incidents that prove or disprove that the employee was subjected to a stress sufficient to bring about the heart attack or reaction. To make this determination is extremely difficult because of the limits of medical knowledge as to etiology. Rarely can a physician determine if a heart attack is related to a particular stress nor can he point with any degree of certainty to the initiating process of any heart attack. Granted there has to be some degree of atherosclerosis of the coronary vessels, but medical science has not been able to predict, far less determine when those particular coronary vessels will occlude and cause the myocardial infarction or a fatal arrhythmia.

The physician usually has a role in determination of problem heart case. He or she should inform the court that the worker did indeed have a heart attack, and present substantiating data. The decision-making process presented in this guide can be used to help obtain the information which should be considered in assessing the relative contribution made to the heart attack by occupational and nonoccupational factors. This information will then assist the decision-maker in rendering judgment in accord with the legal and administrative framework of the state.

Impairment

Impairment is a medical term meaning an anatomic, physiologic, or functional abnormality. It is distinct from disability, which is a legal term which includes the social and economic effects of the impairment. For example, loss of a foot is an impairment that is the same for all individuals. The degree of disability is quite different for one individual who is a football player than another who is a typist.

The concept of impairment enters into discussions of occupational disease when one tries to measure the relative contribution of occupational factors to a preexisting disease, or assess the effect of an occupational disease upon impairment caused by a different disease or condition affecting a different part or function of the body. Medical experts may testify regarding impairment and discuss the causes of the condition; disability and compensability are separate, nonmedical decisions.

SOLUTIONS

There are no clearly visible solutions to the problem of deciding whether or not a disease arising from factors common to both the workplace and nonoccupational environment is truly occupational, or whether a preexisting condition was truly aggravated by an occupational exposure. To assist in arriving at a just decision, the following are suggested:

1. Qualified medical and other professional advice should be obtained during the decision-making process. Consideration should be given to:
 - a. Using this guide as a listing of the information which should be obtained to help support opinions and decisions; and
 - b. Using the services of an impartial advisory board, made up of physicians and industrial hygienists selected by a state or local medical society.

2. Encourage research on the causes of chronic disease and the relative degree of contribution of various factors.
3. Encourage research into the possibility of removing aggravation cases from the "all or nothing" decision realm. While this approach has certain drawbacks, such as penalizing the worker for hereditary factors, it may also make possible partial compensation for diseases not previously held compensable. (This is being done through second injury funds established in some states.)
4. Encourage preventive medicine through pre-placement physical examinations and job selection procedures to place workers in jobs which will not aggravate any of their preexisting health conditions.

SECTION 2. COMPOUNDS FOR 15 SPECIAL AGENTS

ANTIMONY AND ITS COMPOUNDS (EXCEPT STIBINE)

INTRODUCTION

Antimony is a silvery-white lustrous metal which may cause adverse health effects through inhalation, ingestion and skin absorption. Dust and fumes of antimony and its compounds are sources of the hazard.

Antimony is frequently encountered as a fine dust in industry with inhalation being the usual route of entry. Dust may be ingested by swallowing accumulations which have been deposited in the upper respiratory tract.

The symptoms of early antimony poisoning are similar to arsenic and the two elements are often encountered together. Antimony compounds are irritating to the skin and mucous membranes often resulting in dermatitis, rhinitis, inflammation of the upper and lower respiratory tracts, including pneumonitis, gastritis, conjunctivitis and perforation of the nasal septum. Cardiac injury and cases of sudden death have been reported in persons exposed to antimony. (International Labor Office. 1972. Encyclopedia of Occupational Health and Safety. New York: McGraw-Hill.)

Women seem to be more susceptible to the effects of antimony than are men.

Antimony ores may contain silica and may cause silicoantimoniosis, a pneumoconiosis (lung disease) found in antimony miners.

Antimony has been found to cause pneumoconiosis in persons working with stibnite, antimony sulfide. Antimony may produce X-ray changes in the lung, but lung function does not seem to be affected.

"Antimony spots" is a dermatitis caused by antimony trioxide in which there is intense itching followed by skin eruption. Lesions tend to occur in hot weather due to dust accumulating on moist skin areas.

Antimony can form many compounds. The following is a listing of common compounds and some common names:

<u>Chemical Name</u>	<u>Common Names</u>
antimony	stibium, regulus of antimony
antimony	barium antimonyl tartrate
antimony chloride oxide	antimony oxychloride, basic antimony chloride, powder of Algaroth, Mercurius vitae
antimony dichlorotrifluoride	antimony chloride fluoride, antimony dichlorofluoride, antimony trifluorodichloride
antimony lactate	
antimony oxysulfide	Kermes, Kermesite, Cathusian powder, pyrostibnite antimony blend
antimony pentachloride	antimonic chloride, antimony perchloride
antimony pentafluoride	
antimony pentasulfide	golden antimony sulfide, antimonic sulfide, antimorial saffron, antimony red, antimony persulfide
antimony pentoxide	antimonic oxide, antimonic anhydride, stibic anhydride, antimonic acid
antimony potassium oxalate	potassium antimony oxalate, potassium oxalatoantimonate
antimony potassium tartrate	tartar emetic, tartared antimony, tartarized antimony, potassium antimony tartrate, potassium antimonyltartrate
antimony sodium gluconate	gluconic acid antimony sodium derivative, antimony gluconate sodium, antimony gluconate complex sodium salt, sodium antimony gluconate, sodium stibogluconate
antimony tartrate	antimony sodium oxide L-tartrate, sodium antimonyl tartrate, Emeto-Na, stibunal
antimony sodium thioglycollate	mercaptoacetic acid antimony derivative sodium salt, antimony sodium thioacetate

<u>Chemical Name</u>	<u>Common Names</u>
antimony sulfate	antimonous sulfate, antimony trisulfate
antimony tribromide	antimony bromide
antimony trichloride	antimony chloride, caustic antimony butter of antimony, antimonous chloride
antimony trichloride solution	antimony chloride solution, liquid butter of antimony
antimony trifluoride	antimony fluoride, antimonous fluoride
antimony triiodide	antimony iodide
antimony trioxide	diantimony trioxide, flowers of antimony, antimony bloom, antimony oxide, antimony white, Senarmontite, Valentinite, Exitelite, Weisspiessglanz
antimony trisulfide	antimonous sulfide, antimony sulfide, needle antimony, stibnite, antimonit, antimony orange

Occupations with Potential Antimony Exposures

ANTIMONY ORE SMELTERS	METAL BRONZERS
ANTIMONY WORKERS	MINERS
CABINET METAL WORKERS	MONOTYPERS
BATTERY WORKERS (STORAGE)	NONDUMMERS
GLASS FOUNDERS	ORGANIC CHEMICAL SYNTHESIZERS
MITTLEMAN METAL WORKERS	PAINT WORKERS
BRONZERS	PAINTERS
BURNISHERS	PERFUME MAKERS
CABLE SPLICERS	PENTER WORKERS
CERAMIC MAKERS	PHARMACEUTICAL WORKERS
COMPOSITORS	PHOSPHOR MAKERS
COPPER REFINERS	PIONEER MAKERS
DYE MAKERS	PLASTER CAST FOUNDERS
ELECTROPLATERS	PORCELAIN WORKERS
EXPLOSIVES MAKERS	POTTERY WORKERS
FERROUS MAKERS	PRINTERS
FOUNDRY WORKERS	PYROTECHNICS WORKERS
FLAMEPROOFERS	RUBBER MAKERS
GLASS MAKERS	SCHEIDEGANTON WORKERS
GLASS DIFFERS (POTTERY)	SOLDER MAKERS
GOLD REFINERS	STEREOTYPERS
INSULATION MAKERS	TYPE OF LETTER WORKERS
INSULATORS (WIRE)	TEXTILE DYEERS
LEAD COLOR WORKERS	TEXTILE FLAMEPROOFERS
LEAD BURNERS	TEXTILE PRINTERS
LEAD WORKERS	TYPE CASTING WORKERS
LEAD TIE WORKERS	TYPE SETTERS
LEAD TIE WORKERS	VULCANIZERS
LEAD TIE WORKERS	ZINC REFINERS

MEDICAL EVALUATIONMedical History

See Decision-Making Process

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Poisoning

Acute poisoning from antimony seldom occurs as an occupational exposure. Signs and symptoms of acute antimony poisoning are chiefly gastro-intestinal:

1. nausea
2. vomiting
3. severe diarrhea with mucus
4. hepatitis may occur
5. kidney inflammation with blood in urine
6. breathing may be slow and shallow
7. coma and death may result, due to circulatory collapse

Signs and Symptoms--Local Effects

Local effects are those due to primary irritation of:

1. skin (moist areas of the body)
2. eyes
3. nose
4. throat
5. gums
6. nasal septum (ulceration)
7. larynx (ulceration)

Signs and Symptoms--Chronic Poisoning

Chronic antimony poisoning results from dust and fume inhalation and/or by ingestion, and occasionally by skin absorption. The symptoms are the following:

1. dryness of throat
2. headache
3. sleeplessness
4. loss of appetite
5. dizziness
6. anemia
7. liver and/or kidney failure are the late stages of disease and may result in death

LABORATORY EVALUATION

See Decision-Making Process. Additional tests which will assist in arriving at a correct diagnosis are:

1. urine antimony--a level of more than 1.0 milligrams per liter reflects excessive antimony in the body
2. blood antimony--a level of more than 2.0 milligrams per 100 grams reflects excessive antimony in the body
3. blood count--may show a polymorphonuclear shift to the left
4. electrocardiogram--in acute antimony poisoning there are changes which may be seen in the ST segment and T waves

NOTE: The symptoms of lead, antimony and arsenic poisoning are very similar. If there are skin lesions, this will help differentiate antimony poisoning from lead poisoning. Diarrhea is more common in antimony poisoning. Lead poisoning usually exhibits constipation.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

ANTIMONY IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

There are three commonly accepted methods of antimony air sampling:

1. impingement

2. electrostatic precipitation
3. mechanical filtration

There are three commonly accepted methods of sample analysis:

1. rhodamine B
2. 9-methyl-2,3,7-trihydroxyfluor-6-one
3. spectrographic

The above are not intended to be exclusive, but alternative methods should be justified.

Allowable Exposure Limits

The Occupational Safety and Health Act (OSHA) limits antimony and its compounds to 0.5 milligrams per cubic meter of air based on an eight hour time-weighted average exposure. Occupational exposure to antimony in amounts greater than this is evidence of a possible causal relationship between disease and occupation.

See References 1-5, Appendix D, Toxicological Data.

CONCLUSION

Diagnostic criteria for occupational antimony poisoning are based on the following:

1. confirmed history of occupational exposure to antimony or one of its compounds
2. clinical findings compatible with antimony poisoning
3. urine antimony levels in excess of 1.0 milligrams per liter
4. blood antimony levels in excess of 2.0 milligrams per 100 grams

INORGANIC ARSENIC (EXCL. ING ARSENICAL GASES)

INTRODUCTION

Arsenic occurs in nature, combined with other metals and ores mined from the earth. Through the process of smelting, arsenic trioxide is produced. From this fine, white powder practically all other arsenic compounds are manufactured.

Chronic poisoning can occur in industry and also in the home.

Exposure to arsenic is usually through inhalation, with elevated arsenic levels found in the hair, nails, urine and feces.

Arsenic is an irritant to the skin, mucous membranes, and can cause acute and chronic poisoning. Acute arsenic poisoning rarely occurs in industry.

The corrosive action of arsenic causes the perforation of the nasal septum (cartilage separating the nostrils).

Skin manifestations are numerous with chronic arsenic poisoning, and include hyperkeratosis, warts sensitization and possibly loss of hair and nails.

Arsenic may cause skin cancer. Arsenic has a depressant effect on bone marrow, with erythropoiesis and myelopoiesis (disturbances in the process of blood cell formation).

Epidemiological data (experience with groups of people) suggests that there may be a relationship between the development of lung cancer and exposure to arsenic, but this has not been substantiated.

Arsenic can form many compounds. The following is a list of common compounds and some common names:

<u>Chemical Name</u>	<u>Common Names</u>
arsenic	gray arsenic; metallic arsenic
arsenic acid	orthoarsenic acid; true arsenic acid
arsenic disulfide	red arsenic sulfide; realgar; red orpiment; ruby arsenic; red arsenic; red arsenic glass
arsenic hemiselenide	
arsenic pentafluoride	
arsenic pentaselenide	
arsenic pentasulfide	diarsenic pentasulfide
arsenic pentoxide	arsenic acid anhydride; arsenic oxide; arsenic anhydride
arsenic tribromide	arsenic bromide; arsenous bromide; arsenious bromide
arsenic trichloride	butter of arsenic; fuming liquid arsenic; arsenic chloride; arsenous chloride; arsenious chloride
arsenic trifluoride	arsenic fluoride; arsenous fluoride; arsenious fluoride
arsenic triiodide	arsenic iodide; arsenous iodide; arsenious iodide
arsenic trioxide	arsenous acid; arsenous acid anhydride; arsenous oxide; arsenic sesquioxide; white arsenic
arsenic triselenide	arsenious selenide; arsenous selenide
arsenic trisulfide	yellow arsenic sulfide; orpiment; auripigment; arsenic yellow; ping's yellow; ping's gold, arsenic sulfide; arsenious sulfide; arsenic persulfide
arsenious acid solution	arsenic chloride solution
arsenopyrite	mispickel; arsenarsenousulfide
arsine	arsenic trihydride; hydrogen arsenide; arseniuretted hydrogen

<u>Chemical Name</u>	<u>Common Names</u>
calcium arsenate	
copper arsenite	Scheele's green; Swedish green
lead arsenate	lead orthoarsenate
lead arsenite	lead metarsenite
sodium arsenite	sodium metarsenite

Occupations with Potential Exposures to Arsenic

ACETYLENE WORKERS
 ALDIF DIPPERS
 ALLOY MAKERS
 ANILINE COLOR MAKERS
 ANILINE WORKERS
 ARSENIC WORKERS
 ARSINE WORKERS
 ARTIFICIAL FLOWER MAKERS
 BABBIT METAL WORKERS
 BLEACHING POWDER MAKERS
 BOILER OPERATORS
 BOOK BINDERS
 BRASS MAKERS
 BRONZERS
 BRONZE MAKERS
 CAESIUM WORKERS
 CANDLE (COLORED) MAKERS
 CANNERS
 CARPET MAKERS
 CARROTTERS (FELT HAT)
 CATTLE DIP WORKERS
 CERAMIC ENAMEL WORKERS
 CERAMIC MAKERS
 COPPER SHELTERS
 CROP DUSTERS
 DEFOLIANT APPLICATORS
 DEFOLIANT MAKERS
 DIBETHYLSULFATE MAKERS
 DISINFECTANT MAKERS
 DYE MAKERS
 DYE MAKERS
 ELECTROLYTIC COPPER WORKERS
 ELECTROPLATERS
 ENAMELERS
 ENAMEL MAKERS
 ETCHERS
 EXTERMINATORS
 FARMERS
 FEATHER WORKERS
 FERROSILICON WORKERS
 FERTILIZER MAKERS
 FIREWORKS MAKERS
 FLYPAPER MAKERS
 GALVANIZERS
 GLASS MAKERS
 GOLD EXTRACTORS
 GOLD REFINERS
 GUM REMOVER MAKERS
 HERBICIDE MAKERS
 FINE PRESERVERS
 HYDROCHLORIC ACID WORKERS
 ICE MAKERS
 INSECTICIDE MAKERS
 ISOCYANATE GAS WORKERS
 JAPAN MAKERS
 JAPANERS
 JEWELERS
 LEAD BURNERS
 LEAD SHOT MAKERS
 LEAD SHELTERS
 LEATHER WORKERS
 LINE BURNERS
 METAL CLEANERS
 METAL REFINERS
 MINERS
 MORDANTERS
 NITROCELLULOSE MAKERS
 ORE SHELTERS
 ORGANIC CHEMICAL SYNTHESIZERS
 PAINTERS
 PAINT MAKERS
 PAPER MAKERS
 PAPER HANGERS
 PETROLEUM REFINERY WORKERS
 PIGMENT MAKERS
 PHARMACEUTICAL WORKERS
 PLASTIC WORKERS
 PLUMBERS
 PRINTING INK WORKERS
 PYROTECHNICS WORKERS
 RAYON MAKERS
 RODENTICIDE MAKERS
 SEALING WAX MAKERS
 SEMICONDUCTOR COMPOUND MAKERS
 SHEEP DIP WORKERS
 SILVER REFINERS
 SODA MAKERS
 SOIL STERILIZER MAKERS
 SOLDERERS
 SUBMARINE WORKERS
 SULFURIC ACID WORKERS
 TANNERS
 TAR WORKERS
 TAXIDERMISTS
 TEXTILE PRINTERS
 TIMBERS
 TREE SPRAYERS
 TYPE SETTING WORKERS
 VARNISH MAKERS
 WALLPAPER HINGERS
 WAREFARE GAS MAKERS
 WATER USED CONTROLLERS
 WELD SPRAYERS
 WIRE GRINDERS
 WOOD PRESERVATIVE MAKERS
 WOOD PRESERVERS
 ZINC CHLORIDE MAKERS
 ZINC DUSTERS
 ZINC REFINERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any history of any skin, gastro-intestinal or neurological diseases (digestive or nervous systems) should be carefully evaluated to determine if present symptoms are in fact associated with a previous disease or injury.

Personal History

In addition, exposure to arsenic may occur in hobby or home activities. Included are the following:

1. farming
2. gardening
3. wine making
4. exterminating
5. diets very heavy in seafood
6. living near industrial plants with large amounts of arsenic being released from the plant (such as smelting plants)
7. ceramics and related hobbies
8. wood preserving

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--General

1. arsenic has a depressant effect on bone marrow, with disturbances in erythropoiesis and myelopoiesis (the process of blood cell formation)
2. irritation of mucous membranes
3. dermatitis
4. hyperkeratosis
5. warts

6. sensitization

Signs and Symptoms--Acute Poisoning from Inhalation

Acute arsenical poisoning due to inhalation of dust or fumes of arsenic compounds occur infrequently from occupational exposure. When it does occur, the following are the signs and symptoms:

1. cough
2. chest pain
3. breathing difficulty
4. gastro-intestinal symptoms
5. there is headache and extreme generalized weakness

NOTE: With this form of arsenic poisoning, the respiratory tract symptoms precede the gastro-intestinal symptoms.

Signs and Symptoms--Acute Poisoning from Ingestion

Acute toxic effects of arsenic are usually present following ingestion of significant amounts of the material. This seldom occurs from an industrial exposure. Symptoms can occur from one-half to four hours after ingestion and include the following:

1. constriction of the throat
2. difficulty in swallowing
3. epigastric pain (pain in the region over the pit of the stomach)
4. vomiting and watery diarrhea (blood may be present in the stools)
5. shock may develop and death ensue

Signs and Symptoms--Chronic Poisoning from Inhalation

The early signs and symptoms of chronic arsenic poisoning resemble many diseases, including early lead poisoning. In occupational exposure to arsenic, the most common cases are due to inhalation of inorganic arsenic compounds. There are sometimes three phases of signs and symptoms:

1. Phase I
 - a. weakness

- b. nausea
 - c. occasional vomiting
 - d. feeling of "heaviness" in the stomach
 - e. some diarrhea
2. Phase II
- a. conjunctivitis (inflammation of the mucous membrane of the eye)
 - b. dryness of the mucous membranes in the nose, throat and respiratory passage
 - c. hoarseness and mild tracheo-bronchitis
 - d. perforation of the nasal septum (cartilage separating the nostrils) is common
 - e. eczema or allergic reactions on the skin such as thickening of the skin of the palms and the soles of the feet
3. Phase III
- a. peripheral neuritis (inflammation of the nerves mainly in the hands and feet)
 - b. when there is sensory impairment, ataxia (muscular incoordination) may occur, and in more severe cases, motor paralysis occurs

Signs and Symptoms--Chronic Poisoning From Ingestion

Chronic poisoning from the ingestion of arsenic is rare, but may be due to inhaled arsenic accumulated in the upper respiratory tract and swallowed. Symptoms include:

- 1. weight loss
- 2. nausea
- 3. diarrhea alternating with constipation
- 4. skin eruption (rash) and pigmentation (coloration)
- 5. loss of hair
- 6. peripheral neuritis

LABORATORY EVALUATION

See Decision-Making Process

Analysis of the urine for the presence of arsenic is considered the most useful test, as it measures recent exposure. "Normal" urinary arsenic levels are less than 0.1 milligrams per liter of urine in a 24-hour specimen. (Schrenk, H.H.; and Schreibeis, E., Jr. 1958. A.T.H.A.J. 19:225.) Urine levels of arsenic greater than 0.2 milligrams per liter suggest excessive arsenic in the body.

However, since arsenic is found widely in nature, there is a well-recognized acquired tolerance of the body for arsenic, persons with levels greater than 0.2 milligrams per liter may not necessarily have arsenic poisoning. Conversely, persons with urine arsenic levels less than 0.2 milligrams per liter may in fact have arsenic poisoning.

Blood count will usually show a lowered white cell count, anemia, and there may be basophilic stippling of the red cells.

An additional test that will assist in arriving at a correct diagnosis is bioassay of nails. Maximum arsenic level is 0.52 - 3.5 ppm for fingernails, 0.52 - 5.6 ppm for toenails. (Buchanan, W.D. 1962. Toxicity of Arsenic Compounds. New York: Elsevier.)

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

ARSENIC IN THE WORK ENVIRONMENT

To help determine the relationship between illness and occupation, occupational exposure data is valuable.

See Decision-Making Process

Air Sampling and Analysis

There are three commonly accepted methods of arsenic air sampling:

1. impingement
2. electrostatic precipitation
3. mechanical filtration

There are six commonly accepted methods of air sample analysis:

1. Gutzeit method

2. silver diethyldithiocarbamate method
3. iodine microtitration
4. atomic absorption spectrophotometry
5. heated graphite furnace
6. anodic stripping voltammetry

The above methods are not intended to be exclusive; but other methods used should be justified.

The Occupational Safety and Health Act (OSHA) limits arsenic and its compounds (except arsine) to 0.5 milligrams per cubic meter of air (as As) based on an eight hour time-weighted exposure.

The OSHA allowable limit for calcium arsenate is 1.0 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

The OSHA allowable limit for lead arsenate is 0.15 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

Occupational exposure to arsenic or its compounds in amounts greater than the OSHA limits is evidence of a possible causal relationship between disease and occupation.

See References 6-11, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational arsenic poisoning are based on meeting the following:

1. Confirmed history of occupational exposure to arsenic or one or more of its compounds.
2. Clinical findings compatible with arsenic poisoning.
3. Analysis of urine (or nails) for arsenic is of value in confirming exposure, but is not diagnostic in itself.

ASBESTOS

INTRODUCTION

Asbestos is a mineral fiber, and is the name given to about thirty silicate compounds. Of these, only the following six are of significance in industry:

Chrysotile (white asbestos)	Crocidolite (blue asbestos)
Amosite	Anthophyllite
Tremolite	Actinolite

Chrysotile accounts for about 97 percent of all the asbestos used in this country.

Asbestos is widespread in the environment because of its extensive use in industry and the home. Over 3,000 products contain asbestos.

Because of this wide usage it may be difficult at times to determine if a disease arising from asbestos is occupational in origin. For example, the air of some relatively new apartment buildings has been found to contain more asbestos fibers than the maximum recommended levels in industry. The source of the fibers in the apartment buildings is the insulating materials used in the ventilating system.

Exposure to asbestos can produce a lung fibrosis called asbestosis. The onset of asbestosis is usually gradual, developing over a period of 10 to 30 years of exposure to significant concentrations of asbestos. Occasionally, from very massive exposures, it may develop more quickly.

Asbestos is also a cancer producing agent (bronchogenic carcinoma, mesothelioma) and can cause certain specific skin diseases (asbestotic subcutaneous granulomatosis and asbestotic cutaneous verrucos). Heavy exposure to dust containing asbestos can cause skin irritation. Epidemiologic studies (experience with groups of people) and animal studies have shown that increased exposure to any of the types of asbestos increases the risk of lung cancer (bronchial carcinoma). This carcinoma appears to be related to the degree of exposure to asbestos, the type of asbestos and cigarette smoking. It is also significant that cigarette smoking in men and women greatly increase the risk of lung cancer in those who are exposed to asbestos. Smoking is a factor that should be considered when determining whether lung cancer is caused, wholly or in part, by an occupational exposure to asbestos.

Mesothelioma, a rare malignant tumor of the membrane which lines the lung cavity, the abdominal cavity, and the heart cavity, is occurring with increasing frequency in workers with

exposure to asbestos. The development of this tumor apparently is not related to the amount of asbestos absorbed, and it is found in persons not having asbestosis. Levels of exposure which are within accepted standards for protection against asbestosis, may not protect against mesothelioma.

An increased incidence of malignancy of the stomach and colon has been reported among insulation workers using asbestos.

Occupations with Potential Exposure to Asbestos[illegible]

COURTNEY, VA 22031-3414
FLORIAN, J. A. CONSTRUCTION
BIRMINGHAM, AL 35202
JIMMIE
LAWRENCE, L. P. FOR BUILDERS
CASHOT BUILDERS
HOOT, B. L. EAST COASTING TAPER
IN PLASTER CONCRETE
JONES, E. L. FOR BETHA BUILDERS
JONES, G. AND GARY BUILDERS
LADON, P. R. GOOD INSTALLERS
LUGGERS
PAINT TAPERS
PIPE, DRILLERS
PLASTER, PAINTERS
PUMP, COILING BUILDERS
ROCKERS
ROOFING MATERIALS MAKERS
ROOPER, CONCRETE BUILDERS
SHINGLE BUILDERS
SHIR, B. D. BERNARD
SHIR, B. D. ITHER BUILDERS
SHIRK, G. (ALLS, CO.)
TALCO BUILDERS
TALCO BUILDERS
TEXTILE, PLASTER BUILDERS
TEXTILE BUILDERS
UNDERBUILDERS
VINYL, PLASTER, TILE BUILDERS
VINYL, PLASTER, TILE INSTALLERS
WARRIOR, CONCRETE

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any history of diseases of the heart or lung or abnormal tissue growth should be carefully evaluated to determine the relationship between the previous disease and the claimant's present condition
7. a respiratory questionnaire, a sample of which is shown in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms such as:
 - a. breathlessness
 - b. phlegm (sputum) production
 - c. chest pain
 - d. cough
 - e. wheezing

CLINICAL EVALUATION

See Decision-Making Process .

Signs and Symptoms--Asbestosis

Shortness of breath is usually the first symptom, noted upon exertion, frequently accompanied by a dry cough. This symptom develops after several years of progressive pulmonary fibrosis. As asbestosis progresses, the following signs and symptoms are observed:

1. cough with production of sputum
2. anorexia (loss of appetite)
3. secondary respiratory infections that are difficult to control
4. rapid breathing
5. repetitive end-inspiratory crackles (crackling sounds heard in the lower part of the lungs through stethoscope when employee completes each of a series of inhaled breaths)

6. orthopnea (breathing difficulty in a recumbent position)
7. cyanosis (change in skin color to bluish, grayish, slate-like or dark purple)
8. decrease of chest expansion
9. digital clubbing (rounding of the ends, and swelling of the fingers and/or toes)
10. sequelae (other resultant diseases) including cor pulmonale (right heart failure), bronchiogenic carcinoma (lung cancer), stomach or intestinal cancer, or pleural carcinoma (cancer of the membrane lining the chest)

Fibrosis results in alveolo-capillary block (impaired ability of the lungs to transfer oxygen into the blood). This impairment is often more severe than is indicated by chest X-rays.

Signs and Symptoms--Mesothelioma

In cases of mesothelioma, the rare malignancy noted above, there may be a long latent period, as much as 40 years, between initial exposure to asbestos and the development of the tumor.

Mesothelioma of the peritoneum (membrane surrounding the abdominal cavity) is usually accompanied by abdominal swelling and pain that is not concentrated in a particular area. Signs and symptoms of this type of tumor (which may be associated with asbestos exposure) include:

1. weight loss
2. obstruction of the bowel
3. excessive accumulation of fluid in the abdominal cavity (ascites) is almost always present

This malignant tumor of the peritoneum may spread to the chest cavity.

With mesothelioma of the pleura, complaints include chest pain and breathlessness. Signs and symptoms of pleural mesothelioma include:

1. pleural effusion (accumulation of fluid in the space around the lungs)
2. the tumor may grow outward through the chest wall in the form of a lump beneath the skin (subcutaneous lump)

3. the tumor may spread to involve bone, lymph glands (nodes) mediastinum (area between the right and left lungs), and pericardium (the sac enclosing the heart). As a result, the supraclavicular nodes may become enlarged, ribs may develop tumors, and obstruction of the superior vena cava (major vein draining the upper portion of the body) may occur.
4. In addition, pericardial effusion (fluid in the heart cavity) may occur, causing tamponade.

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which will assist in arriving at a correct diagnosis are:

Chest X-rays--Findings should be classified according to the ILO/UC 1971 Classification of the Radiographs of the Pneumoconioses. (Appendix B)

Findings for asbestosis vary, but the usual picture shows a density in both lungs, with the lower one-third of the lungs involved. In the affected area there is a "ground glass" appearance.

As asbestosis progresses, more and more of the lung is involved, except the apices (tips of the lungs). The X-rays will show gradual obscuring of the border between the lungs and the diaphragm. It may show shadows from the presence of nodulés.

X-ray findings usually will show the following as the asbestosis progresses:

1. reduced radiographic volume
2. formation of cysts combined with increased size of the heart, dilation (enlargement) of the proximal pulmonary arteries (arteries which lead from the heart to the lungs)

Lung Function Tests--NOTE: Reduced lung capacities and other lung changes do not differ from those resulting from other forms of lung fibrosis, both occupational and nonoccupational. Therefore, the results of lung function tests alone or chest X-ray findings alone do not lead to diagnosis of asbestosis. Asbestos bodies in lymph nodes indicate exposure, but not necessarily asbestosis.

1. Asbestosis causes a reduction in the vital capacity (VC) of the lungs and a reduction in total lung capacity (TLC). These capacities are further reduced as the disease progresses.

2. The residual volume (RV) of the lungs will be normal or slightly increased.
3. The lungs' diffusing capacity for carbon monoxide (D_L) will be reduced.

Other lung function test results which are found in asbestosis include:

4. increased minute ventilation (amount of air breathed in one minute)
5. reduced oxygen in the blood (arterial hypoxemia)
6. increased static transpulmonary pressures
7. decreased lung compliance

An exercise test will result in an increased amount of air required during physical effort, decreased oxygen in the blood, leading to cyanosis.

Sputum Examination--Asbestos fibers or bodies may be found in the sputum. These indicate asbestos exposure, but not necessarily asbestosis. Where cancer cells are present in the sputum, and chest X-ray findings are normal, bronchoscopy may be necessary to confirm and locate the lung tumor.

Skin Tests--The following tests should be performed by the physician to exclude possible infectious diseases:

- | | |
|--------------------------|-----------------|
| 1. PPD (tuberculin test) | 3. histoplasmin |
| 2. blastomycin | 4. coccidioidin |

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

The relationship between asbestos exposure and mesothelioma is based entirely upon epidemiology, just as that between bronchogenic carcinoma (lung cancer) and cigarette smoking.

ASBESTOS IN THE WORK ENVIRONMENT

Historically, there have been two air sampling and analysis methods to determine the quantity of asbestos in the workplace environment. The earlier light field impinger count method allowed only a measure of the overall dust level in the air rather than focusing on the amount of asbestos fibers in the air. The current fiber count method satisfactorily determines the amount of asbestos fibers in the air. It is performed by collecting airborne materials on a membrane filter and then counting the fibers using a phase contrast microscope at a 400 to 450 times magnification ratio (400X-450X).

Asbestos fibers occur in varying lengths and diameters. As of the publication of the guide, the Occupational Safety and Health Act (OSHA) establishes maximum allowable limits for asbestos fibers greater than five micrometers (μm) in length. OSHA limits such asbestos fibers to no more than five fibers per cubic centimeter of air (based on an eight hour time-weighted average exposure).

OSHA further requires that no workers be exposed to more than 10 asbestos fibers (greater than five μm in length) during any one 15 minute period of time.

For samples collected by the field impinger count method, results may be compared to the pre-1970 limit (TLV) of five million particles per cubic foot of air.

Occupational exposure to asbestos fibers five μm in length or greater, at quantities averaging more than five fibers per cubic centimeter of air or frequent exposures to more than 10 such fibers during a 15 minute period of time is evidence of a possible causal relationship between disease and occupation.

See References 14-17, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational asbestosis is based on meeting the following criteria:

1. Confirmed history of occupational exposure to asbestos.
2. X-ray findings compatible with those indicating asbestosis according to ILO/UC 1971 "Classification of Radiographs of the Pneumoconioses."
3. Pulmonary impairment, particularly a decrease in lung diffusing capacity and an increase in alveolar-arterial oxygen difference, as demonstrated by lung function tests.

Diagnostic criteria for occupational mesothelioma is based on meeting the following criteria:

1. Confirmed history of occupational exposure to asbestos.
2. Pathological evidence of mesothelioma.

BENZENE

INTRODUCTION

Benzene is a colorless organic solvent, often referred to as benzol, which exerts an acute narcotic action on the body. Benzene's toxicity is such that its use in industry should be abandoned where another substance could be substituted.

The onset of benzene poisoning is extremely insidious. Benzene interferes with the body's blood forming system and can cause such disturbances as; leukopenia, aplastic anemia, thrombocytopenia and leukemia.

There can be a long latent period from the time of exposure to the development of disease--10 to 15 years is possible.

Common Names for Benzene

benzol	benzole	coal naptha
cyclohexatriene	phene	phenylhydride
	pyrobenzol	

Occupations with Potential Benzene Exposures

ADHESIVE MAKERS	FURNITURE FINISHERS
AIRPLANE DOPE MAKERS	GAS WORKERS - ILLUMINATING
ALCOHOL WORKERS	GLUE MAKERS
CHILDRE MAKERS	HAIIRDRESSERS
CRYSTAL GLASS WORKERS	HERBICIDE MAKERS
ARTIFICIAL LEATHER MAKERS	HISTOLOGY TECHNICIANS
ASBESTOS PRODUCT IMPREGNATORS	INK MAKERS
AUTO PAINTERS	INSECTICIDE MAKERS
BATTERY (DRY) MAKERS	LACQUER MAKERS
BELT SCOURERS	LEATHER MAKERS
BENZENE HEXACHLORIDE MAKERS	LINOLEUM MAKERS
BENZENE WORKERS	LITHOGRAPHERS
BRAZELING MAKERS	MALEIC ACID MAKERS
BRASSERS	MILLINERY WORKERS
BURNISHERS	MIRROR SILVERERS
CAN MAKERS	MORDANTERS
CARBOXYLIC ACID MAKERS	NITROBENZENE MAKERS
CASE SCRUBBERS (ELECTROPLATING)	NITROCELLULOSE WORKERS
CHLOROBENZENE MAKERS	OILCLOTH MAKERS
CHLORODIPHENYL MAKERS	OIL PROCESSORS
COAL TAR REFINERS	ORGANIC CHEMICAL SYNTHESIZERS
CLUTCH DISC IMPREGNATORS	PAINTERS
COAL TAR WORKERS	PAINT MAKERS
CORBLERS	PARAFFIN PROCESSORS
CURE OVEN WORKERS	PENCIL MAKERS
CYCLOHEXANE MAKERS	PERFUME MAKERS
CUT MAKERS	PETROCHEMICAL WORKERS
DEGREASERS	PETROLEUM REFINERY WORKERS
DETERGENT MAKERS	PHARMACEUTICAL WORKERS
DICHLOROBENZENE MAKERS	PHENOL MAKERS
DIPHENYL MAKERS	PHOTOGRAPHIC CHEMICAL MAKERS
DISINFECTANT MAKERS	PICRIC ACID MAKERS
DRUG MAKERS	POLISH MAKERS
DYE CLEANERS	POTTERY DECORATORS
DYE MAKERS	PRINTERS
ELECTROPLATERS	PUTTY MAKERS
ENAMELERS	REGLAZERS (RUBBER)
STYRENE MAKERS	RESIN MAKERS
SYNTHETIC FIBER MAKERS	ROTOGRAVURE PRINTERS
TOBACCO SEEDLING TREATERS	RUBBER CENTERS
TRINITROTOLUOL MAKERS	RUBBER GASKET MAKERS
TYPE CLEANERS	RUBBER MAKERS
VARNISH MAKERS	SHELLAC MAKERS
VULCANIZERS	SHOE FACTORY WORKERS
WAX GAS MAKERS	SHOE FINISHERS
WAX MAKERS	SOAP MAKERS
WELDERS	SOLVENT MAKERS
WINDSHIELD MAKERS	STAINERS
WIRE INSULATORS	STAIN MAKERS
LEATHER WORKERS	ENGRAVERS
FOOTWEAR MAKERS	ETHYLENE MAKERS
FOUNDRY MAKERS	EXPLOSIVE MAKERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any history of blood dyscrasia, bleeding abnormalities, renal (kidney) disease, hepatic (liver) disease or serious infections should be carefully evaluated to determine if present findings may be associated with a previous disease.

Personal History

Exposure to benzene may occur in a hobby or home activities. Included are the following:

1. woodworking hobbies
2. furniture refinishing
3. paint stripping
4. use of certain dry cleaners and spot removers
5. use of gasoline

Household substances which may contain benzene include:

1. drycleaning fluids
2. paint, wax, lacquer, and grease spot removers
3. leather preservatives
4. dyes

Occupational History

In addition, the following should be considered:

8. any known exposure to benzene or any other poisonous substances affecting the blood or blood-forming tissues (hematologic toxins)
9. ionizing radiation exposures (which also affect the blood forming organs)
10. radiomimetic substances (those which imitate radiation effects)

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Benzene Poisoning

Acute benzene intoxication occurs following exposure to high levels of benzene vapor. Signs and symptoms include:

1. an initial state of euphoria (exaggerated feeling of well-being)
2. giddiness
3. headache
4. nausea
5. staggering gait
6. unconsciousness and respiratory paralysis if not removed from exposure

Ingestion of benzene results in its absorption into the blood, leading to the above signs and symptoms of systemic intoxication.

Skin contact with liquid benzene may cause erythema (a small spot or colored area of redness on the skin) and blistering. A dry, scaly dermatitis may develop from prolonged or repeated exposure.

Signs and Symptoms--Chronic Benzene Poisoning

Chronic poisoning usually results from exposures to the vapor, and may be contributed to by absorption through the unbroken skin. Chronic benzene poisoning with its injurious effects on the hematopoietic system (blood forming organs) is the form most commonly seen in industry. There is anemia, leukopenia, and thrombocytopenia. The clinical manifestations of chronic benzene poisoning tend to be insidious in onset and are non-specific. They resemble those of many other diseases:

1. loss of appetite
2. feeling of tiredness, lassitude, weariness or extreme fatigue
3. headache
4. dizziness
5. irritability

Other symptoms may include:

6. bleeding from the gums
7. tendency to bruise easily
8. nose bleeds
9. menstrual and fertility disturbances
10. reduced white and red blood cell counts
11. reduced hemoglobin (that part of the red blood cell that carries oxygen and carbon dioxide)
12. decreased platelets
13. elevated reticulocyte count (number of young red blood cells)
14. increased mean corpuscular volume (average volume of red blood cells)

With chronic benzene intoxication the bone marrow may have reduced or defective production of blood cells (hypo-plastic), or may be relatively unchanged.

Symptoms may persist for a considerable length of time even after treatment. Additionally, signs and symptoms may develop long after removal from the benzene exposure.

LABORATORY EVALUATION

See Decision-Making Process

Additional laboratory tests which are useful include:

4. platelet examination
5. hematocrit (determination of the volume of red blood cells present in the blood)
6. hemoglobin
7. mean corpuscular volume
8. reticulocyte count
9. serum bilirubin (determining the amount of yellow pigment of bile (bilirubin) in the blood)
10. urinary phenol--less than 75 milligrams per liter is normal

11. ratio of inorganic to total sulfates in urine (this test must be done within one hour after the end of the workday exposure). Normal limits: 0.05 to 0.1 milligrams per liter
12. sternal bone marrow biopsy may show hypoplastic or hyperplastic changes

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

BENZENE IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

There are five commonly accepted methods of benzene air sampling:

1. absorption in anhydrous methanol
2. absorption in nitrating solutions
3. direct collection of whole-air samples
4. adsorption on silica gel
5. adsorption on activated carbon

There are three commonly accepted methods to analyze the samples for presence of benzene:

1. colorimetric evaluation
2. ultraviolet spectrophotometry
3. gas chromatography

These methods are not intended to be exclusive, but other methods should be justified.

Various types of direct reading field instruments are also available to measure benzene concentrations in air. They include detector tubes, combustible gas meters, flame ionization meters, portable gas chromatographs, and portable infrared analyzers.

The Occupational Safety and Health Act (OSHA) allowable limit for benzene is 10 parts per million by volume based on an eight hour time-weighted average exposure.

OSHA has also established an exposure ceiling of 25 parts per million. This ceiling limit should not be exceeded except for one period of time per day not exceeding ten minutes during which a peak concentration of 50 parts per million is permitted.

Benzene may be absorbed through the skin in large enough amounts to contribute to exposure.

CONCLUSION

Diagnostic criteria for chronic occupational benzene poisoning is based on meeting the following:

1. Confirmed history of occupational benzene exposure.
2. Clinical signs and symptoms consistent with benzene poisoning.
3. Findings from blood studies consistent with aplastic anemia and/or leukopenia and/or thrombocytopenia and/or leukemia.

It is possible to have the signs and symptoms of chronic benzene poisoning with a normal blood picture.

Urine phenol and sulfate levels are not diagnostic by themselves, but are indicative of excessive exposure to benzene.

BERYLLIUM

INTRODUCTION

The compounds of beryllium are very toxic substances. A number of harmful effects have been recognized as due to the metal and its compounds, except beryl ore, the chief source of beryllium. The compounds can cause conjunctivitis, usually associated with a facial dermatitis. They can also cause irritation of the upper respiratory tract, dermatitis, a benign tumor occurring under the skin, (subcutaneous granulomata) and acute and chronic forms of lung disease. They are systemic poisons, affecting not only the lungs, but other organs including liver, spleen, and bone.

Dermatitis can occur on any part of the body exposed to beryllium compounds. It appears to be a sensitization reaction occurring about two weeks after exposure. Once sensitized, a person should not again work with beryllium compounds since the dermatitis may be triggered by a normally light exposure to the substance. The dermatitis is self-limiting, and disappears after the exposure ceases.

Tracheitis and bronchitis (inflammation of the trachea and bronchi), and irritation of the nose and throat may occur from inhalation of beryllium fumes or dust. At times, systemic symptoms may develop producing anorexia (loss of appetite), dyspnea (shortness of breath) and loss of weight. These signs and symptoms clear about two weeks after exposure ceases.

Perforation of the nasal septum (cartilage separating the nostrils) may occur. Following exposure to larger quantities of the toxic substances, a nonproductive cough, substernal pain (behind the breastbone) and breathing difficulty occur. A chest X-ray may show increased bronchial markings, however, the X-ray in itself is not diagnostic.

Death has occurred from acute exposure to beryllium compounds but usually the symptoms subside within three to four weeks, or in some cases, within a year.

When the beryllium compound is introduced into or under the skin through cut or break in the skin, a subcutaneous granulomata may occur, sometimes called a beryllium ulcer. The surgical removal of the tumor is required, and uncomplicated healing usually occurs.

While berylliosis (chronic beryllium poisoning) in most cases is confined to the lungs or respiratory tract, its onset may also result in malaise, weight loss, fatigue, difficult breathing or cough. These may occur while the person is exposed

to the materials, or they may be delayed for months or many years--in some cases 20 years--after the last exposure.

A precipitating factor in the onset of symptoms may be elective surgery, pregnancy, or an illness. Cases have been found based on X-rays, without the expected symptoms, however, X-ray itself is not diagnostic.

Chronic berylliosis has a poor prognosis, with alternating periods of remission (lack of symptoms) exacerbation (aggravation of symptoms) over a matter of years. Joints, kidneys, liver and other organs may be involved. Even with long periods of remission there is usually residual damage.

Diagnosis of chronic beryllium poisoning is often difficult.

Occupations with Potential Beryllium Exposure

BERYLLIUM ALLOY MACHINERS	GAS MANTLE MAKERS
BERYLLIUM ALLOY MAKERS	GLASS MAKERS
BERYLLIUM COMPOUND MAKERS	GYROSCOPE MAKERS
BERYLLIUM-COPPER FOUNDERS	INTERNAL GUIDANCE SYSTEM MAKERS
BERYLLIUM-COPPER GRINDERS	METALLURGISTS
BERYLLIUM-COPPER POLISHERS	MISSILE TECHNICIANS
BERYLLIUM EXTRACTORS	MOLD MAKERS (PLASTIC)
BERYLLIUM METAL MACHINERS	NEON SIGN WORKERS
BERYLLIUM MINERAL MINERS	NEON TUBE MAKERS
BERYLLIUM PHOSPHOR MAKERS	NONSPARKING TOOL MAKERS
BERYLLIUM WORKERS	NUCLEAR PHYSICISTS
CATHODE RAY TUBE MAKERS	NUCLEAR REACTOR WORKERS
CERAMIC MAKERS	PLASTICS WORKERS
CHROME PLATERS	PRECISION INSTRUMENT MAKERS
COMPUTER PARTS MAKERS	REFRACTORY MATERIAL MAKERS
ELECTRIC EQUIPMENT MAKERS	SILVER PLATERS
FLUORESCENT SCREEN MAKERS	SOLID ROCKET FUEL MAKERS
	X-RAY TUBE MAKERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. a respiratory questionnaire, such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms such as:
 - a. breathlessness
 - b. sputum production
 - c. chest pain
 - d. cough
 - e. wheezing

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Beryllium Exposure

1. mucous membranes of nose are red and swollen
2. substernal pain
3. dyspnea
4. rales-(crackling sounds (through stethoscope) in mid to low portions of back)
5. cyanosis
6. tachycardia
7. X-ray appearance suggests a pulmonary edema or miliary process
8. anorexia and weight loss are common if the disease progresses slowly

Signs and Symptoms--Chronic Beryllium Exposure

Chronic beryllium disease is systemic. It produces granulomata throughout the body, but the lungs are most affected. With chronic beryllium disease (berylliosis) there is:

1. cough
2. shortness of breath
3. rapid breathing
4. weakness and joint pain
5. weight loss and severe loss of appetite (this may differentiate berylliosis from sarcoidosis)
6. skin lesions may be present
7. in the advanced stages of the disease, the following may be present:
 - a. cyanosis
 - b. digital clubbing (swelling and rounding of the ends of the fingers and/or toes)
 - c. enlargement of the liver and spleen
 - d. kidney stones

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which will assist in arriving at a correct diagnosis are:

Chest X-Ray--changes are nonspecific consisting of:

1. diffuse, fine, sand-like nodulation
2. larger, blotchy infiltrates may also be seen
3. hilar adenopathy (enlargement and diseased appearance of the hilar nodes) is a frequent accompaniment

Lung Function Tests--lung functions may or may not be defective, but usually a reduced diffusing capacity is found. FVC and FEV₁ are most affected.

Test results may indicate:

1. elevated serum protein
2. increased gamma-globulin fraction of serum protein
3. elevated serum uric acid

4. increased hematocrit (volume of erythrocytes in blood)
5. abnormal liver function

Analysis of urine and lung tissue establishes the presence of beryllium in the body. The Curtis Patch test is often positive, but may be negative even when disease is present, and is no longer considered to be diagnostic.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Acute lung inflammation (pneumonitis) has been seen more in extraction workers. Chronic beryllium disease was seen more in fluorescent lamp workers. The disease is no longer seen in workers employed in this industry after 1949 since the discontinuance of the use of beryllium phosphors in that year.

The Beryllium Case Registry, established in 1959, has contributed much epidemiological evidence concerning this disease.

BERYLLIUM IN THE WORKPLACE ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

There are two commonly accepted methods of beryllium air sampling:

1. mechanical filtration
2. electrostatic precipitation

There are three common methods to analyze the samples for presence of beryllium:

1. colorimetrically
2. fluorimetrically by the Morin method
3. spectrographically

These methods are not intended to be exclusive, but other methods should be justified.

Allowable Exposure Limits

The Occupational Safety and Health Act (OSHA) allowable limit of beryllium and its compounds is two micrograms per cubic meter of air, based on an eight hour time-weighted average

exposure.

OSHA has also established an exposure ceiling of five micrograms per cubic meter of air. This ceiling limit may not be exceeded during each eight hour work shift except for one period of time not to exceed 30 minutes during which the peak concentration is 25 micrograms per cubic meter.

See References 26-28, Toxicological Data, Appendix D.

CONCLUSION

Acute occupational beryllium pneumonitis is diagnosed when:

1. there is a confirmed history of occupational exposure to a beryllium compound
2. changes in chest X-rays are seen
3. the signs and symptoms of lung inflammation (pneumonitis) are present
4. there is a low lung diffusing capacity

The clinical findings of acute beryllium pneumonitis are largely nonspecific. Most of the changes resulting from acute beryllium pneumonitis resolve, on termination of exposure, within one to four weeks.

Chronic beryllium disease (berylliosis) develops in a small percentage of exposed persons and does not necessarily follow acute beryllium pneumonitis. The long latency period for the onset of symptoms differentiates this disease from acute pneumonitis caused by exposure to beryllium.

Chronic occupational berylliosis is diagnosed if the following criteria are met:

1. confirmed history of occupational exposure to beryllium compounds
2. presence of clinical findings that are compatible with the disease
3. laboratory findings as outlined in this guide
4. exclusion of other diseases, particularly sarcoidosis, which resembles berylliosis

CARBON MONOXIDE

INTRODUCTION

Carbon monoxide is a colorless gas produced by incomplete burning of carbon-containing materials. On inhalation it acts as an asphyxiant, causing a decrease in the amount of oxygen delivered to the body tissues. Carbon monoxide combines with hemoglobin (the oxygen carrier in the blood) to form carboxyhemoglobin, which reduces the oxygen carrying capacity of the blood.

The two main sources of carbon monoxide exposure are the internal combustion engine and cigarette smoking.

The blood of cigarette smokers contains between 3 and 10 percent carboxyhemoglobin (COHb) depending on the number of cigarettes smoked and the manner of smoking, inhaling or not inhaling. During smoking, the individual is being exposed to the equivalent of 400-500 parts per million carbon monoxide. The COHb of non-smokers is approximately 0.5-0.8 percent. Thus, in evaluating occupational exposure to carbon monoxide, the smoking habits of the individual must be carefully evaluated.

An exposure to carbon monoxide is usually sudden and the symptoms are acute and rapid in onset. Headache and dizziness may rapidly progress to unconsciousness depending on the rate of buildup of COHb in the blood. Once the person is removed from the carbon monoxide exposure, the process is reversible and there is no permanent damage.

Prolonged exposure and unconsciousness may cause brain damage and result in neurological disturbances.

If chronic carbon monoxide poisoning exists, it is not a clearcut identifiable entity that can be diagnosed. Toxicologic and epidemiologic studies have not yielded adequate information to establish any physical impairment from chronic exposure to carbon monoxide.

Carbon monoxide is especially serious for persons with chronic heart or lung disease. The reason for this is that the carbon monoxide in the blood reduces the amount of oxygen available to an already damaged heart muscle.

Occupations with Potential Exposures to Carbon Monoxide

ACETIC ACID MAKERS	FURNACE WORKERS
AIRPLANE PILOTS	GARAGE MECHANICS
AMMONIA MAKERS	GAS WORKERS (ILLUMINATING)
ARC WELDERS	GASOLINE ENGINE TESTERS
ARTIFICIAL ABRASIVE MAKERS	GAS STATION ATTENDANTS
ARTIFICIAL GAS WORKERS	HEAT TREATERS
AUTOMOBILE USERS	IRON WORKERS
BARRERS	WHAFT RECOVERY FURNACE WORKERS
Blast FURNACE GAS USERS	LAUNDRY WORKERS
DISC-HOLE FILM WORKERS	LIFT TRUCK OPERATORS (PROPANE AND GASOLINE)
BLACKSMITHS	LIME KILN WORKERS
BLAST FURNACE WORKERS	MERCURY SMELTERS
BLOOMERS (BELT HAT)	METAL OXIDE REDUCERS
BOTTLER ROOM WORKERS	METAL REFINERS
BRASS FOUNDRERS	METHANOL MAKERS
BREWERS	MINERS
BRICK BURNERS	MONO PROCESS WORKERS
BUSDRIVERS	MONOTYPERS
CARBIDE MAKERS	NICKEL REFINERS
CABLE SPLICERS	NICKEL SMELTERS
CARBON MONOXIDE WORKERS	ORGANIC CHEMICAL SYNTHESIZERS
CEMENT MAKERS	OXALIC ACID MAKERS
CHARCOAL BURNERS	PATENT LEATHER MAKERS
CHAUFFERS	POLICE
CHIMNEY MASONS	PRODUCER GAS WORKERS
CHIMNEY SWEEPERS	POTTERY KILN WORKERS
COAL DISTILLERS	SANITATION WORKERS
COKE OVEN WORKERS	STEEL MAKERS
CUPOLA WORKERS	SEWER WORKERS
DIESEL ENGINE OPERATORS	STOKERS
COMPRESSED AIR WORKERS	SOLDERERS
DIVERS	TOLL COLLECTORS (HIGHWAY)
DUCK WORKERS	TRAFFIC CONTROLLERS
DRIER WORKERS	TUNNEL ATTENDANTS
ENGINEER	TUNNEL WORKERS
EMBALLERS	WAREHOUSE WORKERS
FISCHER-TROPSCH PROCESS WORK	WATER GAS WORKERS
FORMALDEHYDE MAKERS	WELDERS
FRYING WORKERS	WOOD DISTILLERS
FURNACE STARTERS	ZINC WHITE MAKERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. neurological diseases
7. it is important to note that persons with anemia, cardiovascular disease and chronic lung disease have a decreased ability to resist the effects of carbon monoxide

Occupational History

Potential nonoccupational sources of carbon monoxide include:

1. air pollution (particularly in areas of high motor vehicle use)
2. cigarette smoking
3. cooking with charcoal in enclosed areas
4. burning carbon-containing materials in enclosed space
5. hobbies involved with the operation of automobiles or gasoline engines.
6. working as a volunteer fireman
7. malfunctioning stove, furnace or heater
8. faulty auto exhaust system

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Carbon Monoxide Poisoning

1. headache
2. dizziness
3. nausea
4. vomiting
5. drowsiness

6. loss of consciousness

Initially, there is lack of color in the skin (skin pallor). Later, the skin and mucous membranes may be cherry red due to carboxyhemoglobin formation. Breathlessness upon exertion, rapid throbbing or fluttering of the heart (palpitation) and pain on the surface of the chest in the heart area (precordial pain) may be present. Excess fluid in the lung tissues (pulmonary edema) may also occur, or the victim may develop pneumonia.

It is important to ascertain the circumstances associated with carbon monoxide poisoning since the action of carbon monoxide is favored by conditions of heat, humidity, and a greater amount of muscular activity.

Signs and Symptoms--Chronic Carbon Monoxide Poisoning

There is conflicting opinion concerning the chronic effects of carbon monoxide. Other than increased carboxyhemoglobin levels in the blood, there are few objective signs. Persons with chronic exposure to low levels of carbon monoxide develop a tolerance for it. However, the following have been described as characteristic symptoms of chronic carbon monoxide poisoning:

1. loss of muscular strength and mental alertness
2. persistent headache
3. constant dizziness and light headedness
4. auditory nerve damage

Exposures to low levels of carbon monoxide may cause or enhance myocardial alterations (heart changes) in persons with coronary heart disease.

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which will assist in arriving at a correct diagnosis are:

4. blood carboxyhemoglobin of 10 percent or more
5. hemoglobin value may be increased
6. electrocardiogram may show sinus tachycardia and ST segment changes

7. electroencephalogram may show focal and diffuse epileptiform (resembling epilepsy) changes which later disappear

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Acute carbon monoxide poisoning from inhalation is well documented by scientific literature. However, the question of whether chronic carbon monoxide poisoning exists has not been resolved in spite of numerous studies conducted by various researchers.

CARBON MONOXIDE IN THE WORKPLACE ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

There are a variety of direct reading field instruments for the evaluation of carbon monoxide in air including Hopcalite-type carbon monoxide meters and detector tubes. Air samples can also be collected for carbon monoxide by techniques including adsorption on silica gel. Analysis may be performed by calorimetric, infrared spectrophotometric and gas chromatographic techniques.

These methods are not intended to be exclusive, but other methods should be justified.

Allowable Exposure Limits

The Occupational Safety and Health Act (OSHA) limits carbon monoxide to 50 parts per million parts of air by volume based on an eight hour time-weighted average exposure.

See References 29-38, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational carbon monoxide exposure are based on the following:

1. confirmed history of occupational exposure to carbon monoxide
2. carboxyhemoglobin in excess of 10 percent
3. clinical findings compatible with carbon monoxide poisoning

One medical researcher (Hunter, D. 1969. The Diseases of Occupations, 4th ed. Boston: Little, Brown and Co.) states that claims of impaired health from exposure to carbon monoxide are unjustified unless three conditions can be established:

1. at least a 50 percent saturation of the blood with carbon monoxide (not carboxyhemoglobin) or evidence of enough carbon monoxide in the air to produce it
2. an exposure of at least three hours
3. continuous and complete unconsciousness for at least six hours after return to fresh air

CHROMIC ACID

INTRODUCTION

This guide refers only to the chromium compound chromic acid which is a severe irritant to the skin and corrosive to the mucous membranes. Its effects range from mild dermatitis to corrosion causing perforation of the nasal septum (cartilage separating the nostrils). Septal perforation can occur after relatively short durations of exposure to modest airborne concentrations of chromic acid.

The action of chromic acid appears to be that of local irritation, causing inflammation of the respiratory tract and skin. There is little, if any, evidence to indicate that chromic acid causes systemic intoxication or is a sensitizing agent, as are most chromate compounds and ores.

Epidemiological evidence has been presented to relate pulmonary (lung) cancer to workers exposed to chromate compounds, but none exists for those exposed only to chromic acid.

Common Names for Chromic Acid

chromic acid anhydride	chromium (VI) oxide
chromic anhydride	chromium trioxide

Occupations with Potential Exposures to Chromic Acid

ACETYLENE PURIFIERS
ALUMINUM ANODIZERS
ALUMINUM HARD COATERS
CHROME PLATERS
CHROMIC ACID MAKERS
COLORED GLASS MAKERS
COPPER STRIPPERS
CORROSION INHIBITOR WORKERS
DIFFERS (ACID)
ELECTROPLATERS
INK MAKERS
MICROSCOPICAL PREPARATION WORKERS
OIL PURIFIERS
ORGANIC CHEMICAL SYNTHESIZERS
PHOSPHATE COATING STRIPPERS
PHOTOGRAPHY WORKERS
PICKLERS
REFRACTORY MAKERS
STRIPPERS
TANNERS
TEXTILE MORDANTS

MEDICAL EVALUATIONMedical History

See Decision-Making Process

In addition, the following should be considered: any history of skin disease, allergies, sensitization, or lung disease should be carefully evaluated to determine the relationship between the previous disease and the claimant's present condition.

CLINICAL EVALUATION

See Decision-Making Process

Lesions of the skin caused by the corrosive nature of chromic acid are referred to as "chrome holes" or "chrome ulcers". They are penetrating, have a punched out appearance, and are slow to heal, but often painless. Common sites are around the fingernails, the surface of unprotected finger joints, eyelids and sometimes the forearms.

Signs and Symptoms

The irritating action of the chromic acid on the mucous membranes of the upper respiratory tract produces the following signs and symptoms:

1. inflammation of the mucous membranes
2. nasal discharge containing pus (purulent discharge)
3. formation of crusts with possible bleeding
4. some difficulty in breathing
5. ulcers of the nasal septum
6. there may be perforation of the nasal septum

Inhalation of chromic acid can cause other signs and symptoms:

1. cough and wheezing
2. headache
3. dyspnea (shortness of breath)
4. pain with deep breathing
5. fever and weight loss

6. pulmonary edema (fluid in the lung tissues)
7. lachrimation (watery eyes)
8. conjunctivitis
9. dermatitis and/or skin ulceration
10. chronic asthmatic bronchitis
11. tracheo-bronchitis (inflammation of the mucous membrane of the windpipe)
12. skin discoloration
13. dental erosion
14. damage to the liver and/or kidney

LABORATORY EVALUATION

See Decision-Making Process

There are no specific diagnostic tests. Chromium is a naturally occurring trace element found in human tissue. Blood and urine chromium levels in excess of normal levels are evidence of exposure.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Scientific literature documents the occurrence of chrome ulcers, dermatitis, perforated nasal septum, and tracheo-bronchitis resulting from skin and inhalation exposure to chromic acid and chromates.

CHROMIC ACID IN THE WORKPLACE ENVIRONMENT

See Decision-Making Process

There are two commonly accepted methods of chromic acid air sampling:

1. absorption in distilled water or alkaline solutions
2. filtration

There are three methods commonly used to analyze the samples for presence of chromic acid:

1. titration of liberated iodine with standardized sodium thiosulphate solution

2. colorimetry with hematoxylin or s-diphenylcarbazine
3. atomic absorption spectrophotometry

The above methods are not intended to be exclusive, but other methods used should be justified.

There are also available direct reading field analysis kits for chromic acid based on the colorimetric reaction between chromium and s-diphenylcarbazine.

The Occupational Safety and Health Act limits chromic acid exposure to 0.1 milligrams per cubic meter of air. This is a ceiling limit which should never be exceeded.

See References 39-44, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational disease due to chromic acid are:

1. confirmed history of occupational exposure to chromic acid
2. clinical findings compatible with chromic acid exposure

COKE OVEN EMISSIONS

INTRODUCTION

Coke oven emissions refers to all gaseous and particulate emissions resulting from the destructive distillation of coal in the production of coke.

Persons exposed to coke oven emissions are at increased risk of developing cancer of three sites: skin, respiratory and urinary systems.

Occupations with Potential Exposures to Coke Oven Emissions

COKE OVEN DOOR CLEANERS-LITERMAN
COKE OVEN DOOR MACHINE OPERATORS
COKE OVEN HEATER
COKE OVEN LARRY CAR OPERATORS
COKE OVEN LIDMEN-LARRYMEN
COKE OVEN MAINTENANCE MEN
COKE OVEN PATCHER
COKE OVEN PUSHER OPERATORS
COKE OVEN QUENCH CAR OPERATORS
COKE OVEN TAR CHASER

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any history of skin, genito-urinary or pulmonary disease should be carefully evaluated to determine the relationship between the previous disease and the claimant's present condition
7. a respiratory questionnaire, sample of which is shown on page of Appendix A, can be useful in evaluating respiratory symptoms

CLINICAL EVALUATION

See Decision-Making Process

The location and type of tumor which develops largely determine the clinical findings.

Signs and Symptoms--Lungs

The early signs and symptoms of lung or bronchogenic cancer are nonspecific:

1. cough
2. hemoptysis--coughing up blood
3. chest pain
4. atelectasis (collapsed or non-aerated segment of the lung) may occur
5. fever--continuous or intermittent
6. abnormal appearing cells on routine sputum cytology
7. abnormal routine chest X-ray

Signs and Symptoms--Kidney and Urinary Tract

1. hematuria (blood in urine)--may be intermittent
2. pain in flank
3. weight loss
4. fatigue

5. palpation of mass of flank on routine physical examination. (The majority of kidney tumors occur in the cortex or outer layer of the kidney.)

Signs and Symptoms--Skin

Signs and symptoms of skin cancer (usually a squamous cell epithelioma) include:

1. skin lesion of irregular shape and surface that does not heal
2. surface bleeds easily when bumped or scratched
3. may be oozing of serous fluid with scab formation
4. sometimes lesion is painful

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which should be conducted to determine the presence of a suspected malignancy include:

1. chest X-ray
2. sputum cytology (examination of sputum for cancer cells)
3. bronchoscopy (visual examination of the bronchi)
4. lung biopsy

For carcinoma of the urinary organs--

1. urinalysis to include red blood cell content (although hematuria--blood in urine--may be indicative of carcinoma of the genito-urinary tract, it can also be derived from other causes)
2. examination of the urine for cancer cells (urinary cytology)
3. X-ray examination of the kidney and ureters (pyelography)
4. cystoscopy

For carcinoma of the skin--

1. skin biopsy (microscopic examination of the skin tissue)

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Epidemiological evidence indicates that coal carbonization workers have a high risk of cancer of the skin, lungs, and urinary tract. Relatively recent data indicate an increase in mortality from cancer of the lungs and kidney for these people.

Studies have shown that topside coke oven workers experience a higher rate for carcinoma of the lung than other coke oven workers, while nontopside workers are reported to have a higher rate of carcinoma of the kidney than topside workers. Workers in coke plants who don't work at the coke ovens have an excess rate for carcinoma of the digestive system.

A causal but unproven relationship has also been reported from carcinoma of the larynx, pancreas, stomach, blood forming organs and paranasal sinuses. Production of disease is apparently related to the relative level and length of exposure to coke oven emissions. There is a long latency period (from 15 to 30 years) between the time of exposure and development of carcinoma.

COKE OVEN EMISSIONS IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

Historically, specific fractions of coke oven emissions, most notably the benzene or hexane soluble portion of the coal tar pitch volatiles (CTPV) and the polynuclear aromatic hydrocarbons (PNA), have been evaluated as an index of exposure to coke oven emissions.

Air samples for CTPV are commonly collected by mechanical filtration on silver membrane filters with analysis by gravimetric techniques on either the benzene or hexane soluble fraction.

PNA air samples are commonly collected by mechanical filtration on specially prepared silver membrane filters. Analysis of samples for specific compounds (such as benzo(a)pyrene) is commonly done by chromatography, fluorometry and spectrophotometric techniques.

There is a recently proposed sampling procedure for coke oven emissions based on mechanical filtration of a size-selective portion of the emissions with subsequent analysis by gravimetric techniques.

The above methods are not intended to be exclusive, but other methods should be justified.

OSHA has established a limit of 0.2 milligrams per cubic meter of air for the benzene soluble components of coal tar pitch volatiles from coke oven emissions, based on an eight hour time-weighted average exposure.

OSHA has proposed an allowable limit for the respirable particulate fraction of coke oven emissions of 0.3 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

Standard Advisory Committee on Coke Oven Emissions recommends a standard for benzo(a)pyrene of 0.2 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

See References 45-50, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational carcinoma due to exposure to coke oven emissions are:

1. confirmed history of occupational exposure to coke oven emissions
2. diagnosis of carcinoma as determined by laboratory evaluation and clinical findings

NOTE: As carcinoma also occurs in the population which is not occupationally exposed to coke oven emissions, the decision whether a claimant's carcinoma is work related is most difficult.

COTTON DUST

INTRODUCTION

Although the exact cause is not known, it is thought that inhalation of a trash component of cotton dust, most likely from the bract, is the active agent which causes byssinosis, a respiratory disease.

Not all persons exposed to cotton dust develop byssinosis, but the majority (65 to 75 percent) termed "reactors" do. In the early stages, there are no symptoms except a detectable amount of decreased pulmonary function.

Byssinosis is reversible. After removal of exposure to cotton dust, the symptoms disappear. However, there is a critical point, when irreversible pulmonary (lung) changes occur.

Occupations with Potential Cotton Dust Exposures

Occupations in which exposure to cotton dust may arise are in the growing, ginning, and textile manufacturing of cotton.

HANDPICKERS (COTTON)
 SPINDLE PICKERS (COTTON)
 STRIPPER OPERATORS (COTTON)
 GINNERS (COTTON MILL)
 DRYER OPERATORS (COTTON MILL)
 CLEANER OPERATORS (COTTON MILL)
 GIN STAND OPERATORS (COTTON MILL)
 LINT CLEANER OPERATORS (COTTON MILL)
 PRESS BOX OPERATORS (COTTON MILL)
 OPENERS (COTTON MILL)
 CLEANERS (COTTON MILL)
 PICKERS (COTTON MILL)
 CARDERS (COTTON MILL)
 CARDING MACHINE OPERATORS (COTTON MILL)
 COMBING MACHINE OPERATORS (COTTON MILL)
 GRINDERS (COTTON MILL)
 STRIPPER OPERATORS (COTTON MILL)
 DRAWING FRAME OPERATORS (COTTON MILL)
 ROVING FRAME OPERATORS (COTTON MILL)
 SPINNERS (COTTON MILL)
 TWISTERS (COTTON MILL)
 SPOOLING OPERATORS (COTTON MILL)
 BEAMING OPERATORS (COTTON MILL)
 SLASHING OPERATORS (COTTON MILL)
 WEAVERS (COTTON MILL)

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. if there is a positive history for respiratory allergy, chronic lung disease, other diseases of the cardio-pulmonary system, or a positive history of smoking, the individual is at increased risk from occupational exposure to cotton dust

A respiratory questionnaire, such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms such as:

- a. breathlessness
- b. sputum production
- c. chest pain
- d. cough
- e. wheezing

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms

Early manifestations of byssinosis usually become noticeable after several years of exposure. There is slight chest tightness and dyspnea when reporting to work on Monday, or the first day of exposure after absence from exposure of approximately 40 hours.

The following grading system has been devised to classify the degree of byssinosis according to symptomatology:

- Grade $\frac{1}{2}$ -- occasional chest tightness the first day of the working week

Grade I -- chest tightness and/or breathlessness on Mondays (or first day of work week) only

Grade II -- chest tightness and/or breathlessness on Mondays and other weekdays

Grade III -- the symptoms described for Grade II accompanied by evidence of permanent incapacity from a diminishing level of tolerance for effort and/or reduced ventilatory capacity

As the disease progresses, there is in addition to chest tightness:

1. productive cough
2. wheezing
3. dyspnea

In advanced cases, some relief may occur when exposure to cotton dust ceases, but chronic bronchitis and pulmonary emphysema usually occur, and cannot be differentiated from a nonoccupational form of disease. Right heart failure (cor pulmonale) may develop in severe cases.

The "Monday" feeling of chest tightness is usually accompanied by a decreased FEV₁, the more sensitive measurement, and forced vital capacity (FVC).

When measured daily, the decrease that occurs on Monday is greater than that seen later in the week.

Although early symptoms of byssinosis are reversible if exposure to cotton dust ceases, a point is reached where permanent, irreversible airway obstruction persists.

In addition to byssinosis, there is apparently an increased prevalence of chronic bronchitis in persons with exposure to cotton dust. Emphysema is also frequently associated with byssinosis.

Other conditions which may result from cotton dust exposure are as follows:

1. "Mill Fever"--group of symptoms occurring in those unaccustomed to breathing cotton dust. Symptoms include:
 - a. malaise
 - b. cough

- c. fever
- d. chills
- e. upper respiratory symptoms

These appear shortly after exposure and disappear after acclimatization. But they can reappear after an absence from exposure, or with a marked increase in exposure.

2. "Weaver's Cough"--this disease appears as a sudden epidemic, and is associated with weaving operations only. Its occurrence appears to depend on situations involving mildewed yarns, tamarand seed powder, sizing, or other unknown agents, and not upon cotton dust.
3. Other acute illnesses resulting in fatigue, loss of appetite (anorexia), headache, nausea, and vomiting, have occurred from the use of low grade or stained cotton. The bacteria *aerobacter cloacae* has been a suspected cause.

LABORATORY EVALUATION

See Decision-Making Process

There are no characteristic changes in chest X-ray.

Lung function tests which are generally necessary in making a correct diagnosis, but are not conclusive, include:

1. Forced expiratory volume (FEV₁) at one second-serial measurement shows a significant decline from Monday morning to Monday afternoon. Decrement is greater on Monday than later in the week.
2. Forced vital capacity (FVC) is also decreased. This measurement is less sensitive than the forced expiratory volume at one second, and more dependent upon subject cooperation.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

COTTON DUST IN THE WORK ENVIRONMENT

Air Sampling and Analysis

Air samples for cotton dust are commonly collected by mechanical filtration of either total dust or a size-selective fraction of the total dust (size-selective sampler include the hexhlet sampler, cyclone sampler, and vertical air elutriator). Analysis of these samples is accomplished by gravimetric techniques. There is also a size-selective sampler with analysis based on beta Radiation counts.

The above methods are not intended to be exclusive, but other methods should be justified.

Allowable Limits

The Occupational Safety and Health Act established a limit for exposure to raw cotton dust (total dust sample) of one milligram per cubic meter of air based on an eight hour time-weighted average exposure.

The American Conference of Governmental Industrial Hygienists proposes a threshold limit value for cotton dust (size-selective sample as collected by vertical air elutriation of 0.2 milligrams per cubic meter of air based on eight hour time-weighted average exposure.

See References 51-54, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational byssinosis due to exposure to cotton dust are based on meeting the following:

1. confirmed history of occupational exposure to cotton dust over a period of years
2. chest tightness and dyspnea which appear on Monday morning or the first work day following absences from exposure to cotton dust
3. a reduction of ventilatory capacity following return to work as demonstrated by lung function tests

Although most persons with Grade I, II, or III byssinosis have a moderate to marked decrease in FEV₁, absence of this decrement does not rule out the diagnosis of byssinosis in persons with symptoms.

Chronic bronchitis may exist, but not be associated with byssinosis. The person with chronic bronchitis will usually experience chest tightness when exposed to any dusty atmosphere, whereas, the early byssinotic is affected only by cotton dust, and is worse on returning to work on Monday, or after several days absence.

INORGANIC LEAD

INTRODUCTION

Lead is a naturally occurring element found in some quantity in all persons. This guide discusses only inorganic lead which, in industry, is usually absorbed into the body through inhalation of dust or fumes. Nonoccupational exposure may occur through ingestion such as the lead etched from the glaze of pottery used for food, paint from water pipes, or from food contaminated with lead.

Although lead may be absorbed into the body, absorption does not necessarily constitute lead poisoning. Body burden will affect individual tolerance. At a given body burden, some persons may have signs and symptoms of lead poisoning while others do not.

Lead may be stored in the body and following an illness or some stress factor, it may be released into the system and produce symptoms of lead poisoning.

Lead and its compounds have numerous chemical and common names:

<u>Chemical Name</u>	<u>Common Names</u>
lead	plumbum
lead acetate	normal lead acetate, sugar or "lead, salt of Saturn
lead antimonate	Naple's yellow, antimony yellow
lead borate	
lead bromide	
lead butyrate	butyric acid lead salt
lead carbonate	basic lead carbonate, lead subcarbonate, white lead, flake lead, ceruse, cerussa, cerussite
lead chlorate	
lead chloride	cotunnite, matlockite
lead chromate	chrome yellow, Cologne yellow, king's yellow, Leipzig yellow, Paris yellow, crocoite

<u>Chemical Name</u>	<u>Common Names</u>
lead chromate oxide	basic lead chromate, red lead chromate, chrome red, Persian red, Austrian cinnabar
lead citrate	
lead cyanide	
lead dioxide	lead oxide brown, lead superoxide, lead peroxide, plumbic acid anhydride, plattnerite
lead fluoride	
lead hexafluorosilicate	lead fluosilicate, lead silicofluoride
lead hydroxide	basic lead hydroxide, lead hydrate, hydrated lead oxide
lead iodide	
lead metaborate	
lead metasilicate	alamosite
lead molybdate	wulfenite
lead monoxide	lead oxide yellow, plumbous oxide, litharge, massicot, lead protoxide
lead nitrate	
lead nitrite	
lead phosphate	pyromorphite
lead phosphite	
lead sesquioxide	lead trioxide, plumbous plumbate
lead sulfate	anglisite
lead sulfide	galena, plumbous sulfide
lead tartrate	
lead telluride	altaite
lead tetrafluoride	plumbing fluoride

<u>Chemical Name</u>	<u>Common Names</u>
lead tetraoxide	lead oxide red, red lead, minimum, lead orthoplumbate, mineral orange, mineral red, Paris red, Saturn red
lead thiocyanate	lead sulfocyanate
lead thiosulfate	lead hyposulfate
lead tungstate	raspite, scheelite, stolzite, lead wulfamate
lead vanadate	lead metavanadate, vanadinite

Occupations with Potential Lead Exposures

ACID FINISHERS	ENAMEL MAKERS
ACTORS	EXPLOSIVES MAKERS
BABBLERS	FARMERS
BATTERY MAKERS	FILE CUTTERS
BLACKSMITHS	FIREMEN
BOOKBINDERS	FLOWER MAKERS (ARTIFICIAL)
BOTTLE CAP MAKERS	FOUNDRY WORKERS
BRASS FOUNDERS	GALVANIZERS
BRASS POLISHERS	GARAGE MECHANICS
BRAZERS	GLASS MAKERS
BRICK BURNERS	GLASS POLISHERS
BRICK MAKERS	GLOST-KILN WORKERS
BRONZERS	GOLD REFINERS
BRUSH MAKERS	GUN BARREL BROWERS
CABLE MAKERS	INCANDESCENT LAMP MAKERS
CABLE SPLICERS	INK MAKERS
CANNERS	INSECTICIDE MAKERS
CARTRIDGE MAKERS	INSECTICIDE USERS
CERAMIC MAKERS	JAPAN MAKERS
CHEMICAL EQUIPMENT MAKERS	JAPANNERS
CHLORINATED PARAFFIN MAKERS	JEWELERS
CHIPPERS	JUNK METAL REFINERS
CIGAR MAKERS	LABELERS (PAINT CAN)
CROP DUSTERS	LACQUER MAKERS
CUTLERY MAKERS	LEAD BURNERS
DECORATORS (POTTERY)	LEAD COUNTERWEIGHT MAKERS
DENOLITION WORKERS	LEAD FLOORING MAKERS
DENTAL TECHNICIANS	LEAD FOIL MAKERS
DIAMOND POLISHERS	LEAD HILL WORKERS
DYE MAKERS	LEAD MINERS
DYERS	LEAD PIPE MAKERS
ELECTRONIC DEVICE MAKERS	LEAD SALT MAKERS
ELECTROPLATERS	LEAD SHIELD MAKERS
ELECTROTYPERS	LEAD SHELTERS
EMBROIDERY WORKERS	LEAD STEARATE MAKERS
ENEMY WHEEL MAKERS	LEAD WORKERS
ENAMEL BURNERS	LINOLEUM MAKERS
ENAMELERS	LINOTYPERS

Occupations with Potential Exposures to Inorganic Lead (Cont'd)

LINSEED OIL BOILERS	RUBBER RECLAIMERS
LITHOGRAPHERS	SCRAP METAL WORKERS
LITHOTRANSFER WORKERS	SEMICONDUCTOR WORKERS
MATCH MAKERS	SERVICE STATION ATTENDANTS
METAL BURNERS	SHEET METAL WORKERS
METAL CUTTERS	SHELLAC MAKERS
METAL GRINDERS	SHIP DISMANTLERS
METAL MINERS	SHOE STAINERS
METAL POLISHERS	SHOT MAKERS
METAL REFINERS	SILK WEIGHTERS
METALLIZERS	SLUSHERS (PORCELAIN ENAMELING)
MIRROR SILVERERS	SOLDERERS
MUSICAL INSTRUMENT MAKERS	SOLDER MAKERS
NITRIC ACID WORKERS	STEEL ENGRAVERS
NITROGLYCERIN MAKERS	STEREOTYPERS
PAINTERS	TANNERY WORKERS
PAINT MAKERS	TELEVISION PICTURE TUBE MAKERS
PAINT PIGMENT MAKERS	TEMPERERS
PAPER HANGERS	TEXTILE MAKERS
PATENT LEATHER MAKERS	TILE MAKERS
PEARL MAKERS (IMITATION)	TIN FOIL MAKERS
PHARMACEUTICAL MAKERS	TINNERS
PHOTOGRAPHY WORKERS	TYPE FOUNDERS
PIPE FILTERS	TYPE SETTERS
PLASTIC WORKERS	VANADIUM COMPOUND MAKERS
PLUMBERS	VARNISH MAKERS
PRINTERS	VEHICLE TUNNEL ATTENDANTS
POLICEMEN	WALLPAPER PRINTERS
POTTERY GLAZE MIXERS	WELDERS
POTTERY GLAZE DIPPERS	WOOD STAINERS
POTTERY WORKERS	ZINC MILL WORKERS
PUTTY MAKERS	ZINC SMELTER CHARGERS
PYROXYLIN-PLASTICS WORKERS	
RIVETERS	
ROOFERS	
RUBBER BUFFERS	
RUBBER MAKERS	

MEDICAL EVALUATION

See Decision-Making Process

Personal History

In addition, consider the following:

9. Lead is so widely used that a careful inquiry into hobbies and recreation is especially important. Chronic exposure to inorganic lead in hobbies can produce the same signs and symptoms as occupational lead poisoning, but it is not occupational. Common nonoccupational lead exposures include:
 - a. ceramics, pottery and related hobbies
 - b. electronics and related hobbies involving extensive soldering
 - c. firing ranges
 - d. hunting (especially those who cast their own bullets)
 - e. eating or drinking from improperly fired lead-glazed ceramic tableware
 - f. eating lead-bearing paint (especially children)
 - g. burning battery casings
 - h. consuming illicitly distilled whiskey
 - i. extensive auto driving (especially in cities)
 - j. extensive work with motor fuels
 - k. painting with lead-containing paints
 - l. home plumbing repairs (lead pipe systems)
 - m. exterminating

CLINICAL EVALUATION3. Decision-Making ProcessSigns and Symptoms

Early signs and symptoms of lead poisoning are nonspecific and may resemble many diseases including influenza. Early signs and symptoms are the following:

1. malaise
2. fatigue
3. sleep disturbance
4. irritability
5. aching muscles and bones
6. headache
7. nausea
8. vomiting
9. loss of appetite
10. constipation
11. abdominal cramps

In more advanced cases of lead poisoning, the above signs and symptoms progress and frequently involve the gastro-intestinal and neuro-muscular systems (both nerves and muscles).

Gastro-intestinal signs and symptoms are:

1. severe abdominal pain (lead colic)
2. constipation (never diarrhea)
3. marked loss of appetite (anorexia) leading to weight loss
4. characteristic lead line of the gums may be present

Neuro-muscular symptoms are:

5. generalized tenderness or pain in the muscles (myalgia)
6. muscular weakness, especially of the most frequently used muscles
7. tremors or palsey may be present
8. decreased hand grip strength
9. characteristic "wrist drop" (hand flexed at wrist and cannot be extended) because of nerve involvement
10. the peripheral nerves of the upper extremities are involved; rarely those of the lower extremities
11. decreased fertility in men and spontaneous abortion in women have been reported

A most severe form of lead poisoning is lead encephalopathy, impairment of the brain due to lead poisoning. Lead or Saturnine encephalopathy is rarely seen today because of improved techniques of handling lead. It is a vague term and includes coma, delirium, psychosis, convulsions; muscles affecting speech, eyes and face are often involved. It can result in blindness and death.

LABORATORY EVALUATION

See Decision-Making Process

Signs pertaining to lead's affect on the blood forming organs (hemopoietic system) are determined by laboratory analysis. These signs occur early with excess lead absorption--usually before the outward symptoms of poisoning appear. These tests are useful in the routine biological monitoring of persons exposed to lead.

Abnormal laboratory values that may be found in lead poisoning:

1. RBC (red blood count) will be decreased
2. basophilic punctuated erythrocytes
3. decreased hemoglobin

4. decreased hematocrit
5. increased urinary delta-aminolevulinic acid
6. increased urinary coproporphyrin
7. increased lead in blood
8. increased lead in urine

NOTE: All laboratory blood and urine analysis results are subject to a 10 percent error factor. Blood lead determinations must be corrected for the mass of circulating red cells.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

There is vast scientific literature providing evidence of lead poisoning in workers with a significant exposure. Lead absorption, however, does not necessarily indicate poisoning.

INORGANIC LEAD IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

There are three commonly accepted methods of lead air sampling:

1. impingement
2. electrostatic precipitation
3. mechanical filtration

There are three commonly accepted methods to analyze the samples for presence of lead:

1. atomic absorption spectrophotometry
2. colorimetrically using the dithizone method
3. polarographically

These methods are not intended to be exclusive, but other methods should be justified.

The Occupational Safety and Health Act (OSHA) limits exposure to lead and its inorganic compounds (except lead arsenate) to 0.2 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

The American Conference of Governmental Industrial Hygienists threshold limit value for lead and its inorganic compounds (except lead arsenate) is 0.15 milligrams per cubic meter of air based on an eight hour time-weighted average exposure.

See References 55-60, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational lead poisoning are based on meeting the following:

1. confirmed history of occupational exposure to lead
2. findings compatible with lead poisoning
3. increased lead in blood and/or urine

NOTE: A diagnosis of lead poisoning does not necessarily mean that it is occupational in origin. Further, lead intoxication with symptoms can exist with normal laboratory test findings.

NITROGEN DIOXIDE

INTRODUCTION

Nitrogen dioxide is a common contaminant of the atmosphere and is frequently encountered in the workplace. It is a reddish brown gas that unites with water to form nitric acid and nitrous acid. The body absorbs nitrogen dioxide gas by inhalation; it is an irritant to the mucous membranes of the respiratory tract. Exposure to low concentrations may produce a cough and headache, slightly higher levels may cause a choking sensation.

Nitrogen dioxide is not sufficiently irritating to cause immediate damage to the mucous membrane of the nose and throat. Herein lies its danger, for a seriously damaging dose can be delivered to the lungs while the person is not immediately aware of the danger.

There is often a latent period from the time of initial exposure to the onset of potentially fatal pulmonary symptoms. This period is from 2 to 20 hours, however, bodily exertion can reduce the time.

There is some evidence that low concentrations of nitrogen dioxide can lead to drowsiness, dizziness or vomiting.

Nitrogen dioxide is also known by the following names:

dinitrogen tetroxide	liquid dioxide
nitrogen perioxide	nitrogen tetroxide

Occupations With Potential Nitrogen Dioxide Exposures

ACID DIPPERS	HEAT TREATERS
ANILINE MAKERS	JET FUEL MAKERS
BLUEPRINTERS	LACQUER MAKERS
BRASS CLEANERS	MEDICAL TECHNICIANS
BRAZERS	MINE WORKERS
BRIGHT DIP WORKERS	NITRATE WORKERS
BRONZE CLEANERS	NITRIC ACID WORKERS
CELLULOID MAKERS	NITROGEN DIOXIDE WORKERS
COPPER CLEANERS	NURSES
COTTON BLEACHERS	ORGANIC CHEMICAL SYNTHESIZERS
DENTAL WORKERS	OXIDIZED CELLULOSE COMPOUND MAKERS
DIESEL EQUIPMENT OPERATORS	PHOTOENGRAVERS
DYE MAKERS	PHYSICIANS
ELECTRIC ARC WELDERS	PICKLERS
ELECTROPLATERS	PIPE FITTERS
ETCHERS	PLASMA TORCH OPERATORS
EXPLOSIVES MAKERS	RAW SILK BLEACHERS
EXPLOSIVES USERS	ROCKET FUEL MAKERS
FERTILIZER MAKERS	SILF FILLERS
FLOUR BLEACHERS	SULFURIC ACID MAKERS
AUTO GARAGE WORKERS	TUNNEL WORKERS
GAS SHRINKING OPERATORS	WELDERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any history of past pulmonary (lung) diseases should be carefully evaluated to determine if present symptoms are in fact associated with a previous disease or injury
7. a respiratory questionnaire, such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms such as:
 - a. breathlessness
 - b. sputum production
 - c. chest pain
 - d. cough
 - e. wheezing

Personal History

In addition, exposure to nitrogen dioxide may be from a hobby or from home activities. Included are the following:

1. farming (silo filler's disease)
2. air pollution (especially in cities with heavy vehicle use)
3. automotive and related hobbies
4. welding, especially arc

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Nitrogen Dioxide Poisoning

Following acute inhalation exposure to nitrogen dioxide gas, initial symptoms include:

1. irritation of the throat
2. cough (may be severe)
3. tightness of the chest
4. nausea
5. headache and dizziness

In one to two hours, or longer, the second stage occurs with the following:

1. excessive fluid in the lung tissue (frank pulmonary edema) with:
 - a. skin discoloration to bluish, grayish, slate-like or dark purple (cyanosis)
 - b. nausea and vomiting
 - c. chills-fever
 - d. tightness in the chest
2. on examination, fine crackles and wheezes are heard throughout the lungs

Alternatively, there may be only mild signs of bronchial irritation for several hours, and the symptoms gradually improve over two to three weeks. When the symptoms have subsided and all appears well, the disease becomes more severe. A relapse occurs with fever and chills, cyanosis, dyspnea, and generalized rales in the lungs. This second attack may prove fatal. However, in those who survive, total recovery from this very serious condition usually occurs.

Exposure to high concentrations of the gas can result in acute bronchial irritation and death. If this acute episode is survived, resultant sequelae are bronchial irritation and formation of fibrous tissues in the lungs which result in airway obstruction (bronchiolitis fibrosa oblitterans) may develop in a few days, or be latent for as long as six weeks. Symptoms are:

1. increasing dyspnea
2. often, accompanying fever and cyanosis (skin discoloration)

Signs and Symptoms--Chronic Nitrogen Dioxide Poisoning

The effect of chronic exposure to nitrogen dioxide gas has not been well defined. One study indicates a sporadic cough with production of mucopurulent sputum. Rales were heard in the chests of some men, but lung impairment was not evident. More studies are needed to evaluate chronic effects of nitrogen dioxide.

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which may assist in the diagnosis are:

Chest X-Ray--findings may be that of a chemical pneumonitis or pulmonary edema. Frequently there is a diffuse, fine nodular infiltrate.

Lung Function Test--there may be a reduction in diffusing capacity and lung volume; there may be low arterial oxygen saturation. (These tests should not be performed during acute phase.)

Blood Platelets--may be increased to 10 to 100 percent above normal.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Scientific literature documents the occurrence of pulmonary edema (excess fluid in lung tissue) as a result of inhalation exposure to nitrogen dioxide, and in some instances, bronchial irritation or obstruction.

NITROGEN DIOXIDE IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

Air samples may be collected in impingers or fritted bubblers using an AZO dye forming reagent as an absorbing solution.

There are two commonly used methods of nitrogen dioxide analysis:

1. spectrophotometry (N-1-Naphthylene diamine method)
2. phenol-disulfonic method

The above methods are not intended to be exclusive, but other methods should be justified.

There are also available a number of direct reading field instruments for the determination of nitrogen dioxide concentrations in air. A commonly used field instrument is the detector tube.

The Occupational Safety and Health Act (OSHA) limits exposure to nitrogen dioxide to five parts per million parts of air by volume, based on an eight hour time-weighted average exposure.

See References 61-68, Toxicological Data, Appendix D.

CONCLUSION

There are no specific tests to diagnose nitrogen dioxide poisoning. Diagnostic criteria for occupational nitrogen dioxide poisoning are based on meeting the following:

1. confirmed history of occupational exposure to nitrogen dioxide
2. clinical findings as outlined in this guide

X-ray findings and lung function test results are of diagnostic value, but diagnosis cannot be made on these findings alone.

The clinical findings or effects of inhalation exposure to nitrogen dioxide may simulate other diseases such as pneumonia, acute bronchitis or even cerebral hemorrhage. These entities can usually be excluded by an accurate medical history.

The history of acute nitrogen dioxide exposure is characteristic: initial symptoms subside upon termination of exposure, followed by a sudden onset of pulmonary edema (excess fluid in lung tissue) after a latent period of two to twenty hours.

NOISE

INTRODUCTION

Occupational hearing loss is a slowly induced deafness produced by loud sound in the workplace, over a period of time varying from months to years. Hearing loss may also be immediate such as that caused by a sudden, loud explosion.

Exposure to intense noise for an extended period of time causes hearing loss which is either temporary, permanent, or a combination. Hearing loss is referred to as temporary threshold shift (TTS) or permanent threshold shift (PTS).

Temporary hearing loss means that the person's ability to hear will return to normal when he is absent from the source of the noise for a period of time. In cases of permanent hearing loss, there is never a return of hearing to the previous threshold.

Disability from hearing loss results from the decreased ability to identify spoken words or sentences. Speech is composed of frequencies between the range of 250 and 3,000 Hertz (Hz). Hertz is a unit of measurement of the frequency, sometimes referred to as cycles per second (cps).

The hearing level for speech is a simple arithmetic average of the hearing levels at frequencies of 500, 1000 and 2000 Hz. (Sataloff, J.; and Michael, P. 1973. Hearing Conservation Springfield, Illinois: Charles C. Thomas Co.) Healthy young ears are able to hear sounds through the frequency range from 20 to 20,000 Hz.

Hearing loss from repeated exposure to excessively loud noise usually occurs in the 4,000 Hz area. Since this is above the frequency range of the normal spoken voice, an individual may suffer a decrease in hearing and not be aware of it.

A person's ability to hear high frequencies decreases with age just as his ability to read fine print decreases with age. The hearing deficiency is called presbycusis and the visual, presbyopia. The effects of age on hearing and vision are not the same for all individuals. This adds to the problem of determining if a hearing loss is occupational in origin, or the result of the aging process. However, presbycusis tends to start in the 8,000 Hz frequencies, whereas hearing loss due to noise is usually in the 4,000 to 6,000 Hz range.

Recruitment is present in early cases of deafness due to excessive noise, but not in presbycusis. Recruitment is the inability to understand speech in the presence of surrounding noise. The louder the words are spoken, the more difficult it is to understand them. Noise induced hearing loss usually is bilateral (exists in both ears).

In cases of occupational hearing loss, any accompanying hearing loss due to presbycusis is usually accounted for by allowing a reduction of $\frac{1}{2}$ decibel (dB) for each year of age over the age of 40. The decibel (dB) is a unit for measuring the loudness or intensity of sound. For example, the sound pressure level (loudness) of conversation is between 60 or 70 dBA, a compressor is in the range of 120 dBA, and a turbojet engine 160 dBA. Because noise is not of one frequency (a pure tone such as middle C on the piano) but is composed of a mixture of many frequencies, the so-called A-weighted technique is used for measurement of intensity. It is an average of the intensity of the different frequencies and is expressed as dBA.

Excessive noise can cause physiological problems other than hearing loss. It can have an effect on emotions, produce irritability, increase blood pressure and heart rate and produce nausea. These effects on the worker in a noisy environment are not well defined as an occupational illness, but may have an affect on the quality and efficiency of the work performed.

Occupations with Potential Exposures to Noise

BOILER ROOMS
 CHEMICAL PRODUCTS MANUFACTURE
 CONSTRUCTION
 CORRUGATED PAPER MANUFACTURE
 DEMOLITION
 EARTH MOVING EQUIPMENT OPERATORS
 ELECTRICAL EQUIPMENT MANUFACTURE
 ENGINE ROOMS
 FABRICATED METAL PRODUCT MANUFACTURE
 FARM EQUIPMENT OPERATORS
 FOOD PROCESSING
 FOUNDRIES
 FURNITURE MANUFACTURE
 GLASS MANUFACTURE
 LUMBERING
 METAL FORMING
 METAL MACHINING
 METAL WORKING
 MINING - OPEN PIT
 MINING - UNDERGROUND
 ORDNANCE MANUFACTURING
 PAPER MANUFACTURE
 PAPER PRODUCTS MANUFACTURE
 PETROLEUM REFINING
 PLASTICS MANUFACTURE
 PLASTIC PRODUCTS MANUFACTURE
 POWER PLANT OPERATORS
 PRINTING
 PRIMARY METAL PROCESSING
 QUARRYING
 RUBBER MANUFACTURE
 RUBBER PRODUCTS MANUFACTURE
 SHIPBUILDING
 STEEL MAKING
 STONE PRODUCTS INDUSTRIES (CEMENT MILLS)
 STONE WORKERS
 TEXTILE MANUFACTURE
 TRANSPORTATION EQUIPMENT OPERATORS
 TRUCKING
 TUNNELING
 WOOD PRODUCTS MANUFACTURE

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. any previous history of diseases or injury involving the auditory nerve, capable of causing hearing loss, either as a direct result of disease or injury, should be evaluated to determine if present findings are associated with previous disease or injury.
7. in cases of possible occupationally-induced hearing loss, it is important to evaluate the claimant's medical history pertaining specifically to diseases and conditions of the ear and auditory nerve. Included are the following considerations:
 - a. previous ear trouble and disease
 - b. extent of known hearing loss
 - c. dizziness
 - d. tinnitus (ringing in the ears)
 - e. treatment with drugs (ototoxic drugs)
 - f. head injury
 - g. estimate of subject's own hearing ability

Occupational History

Exposure to noise may be from a hobby or from home activities. Included are the following:

1. woodworking
2. metal working
3. loud music in any form from any source
4. auto repair

5. operating noisy equipment (tractors, lawn mowers, etc.)
6. traffic
7. pistol, rifle or shotgun firing
8. auto racing
9. operating motorcycles, snowmobiles or boats

CLINICAL EVALUATION

See Decision-Making Process

Other Tests

A thorough clinical examination of the ear should be conducted by a competent otologist and include the following:

1. external ear examination for scars or malfunctions
2. otoscopic examination of ear drum (tympanic membrane) for any abnormalities
3. examination of nose, throat, and nasopharynx for any abnormalities
4. eye reflexes are noted (pupil and cornea)
5. examination with tuning fork
6. pure tone audiometric examination
7. bone conduction studies
8. speech reception testing for threshold and discrimination
9. recruitment and tone decay studies
10. other tests may be conducted

If baseline and/or periodic audiometric examinations were conducted by the employer, these test results should be obtained for comparison with present audiometric test results.

LABORATORY EVALUATION

See Decision-Making Process

In addition, the following should be considered:

The audiometric (pure tone) examination is one of the best clinical means of measuring hearing loss, although other examinations as referred to above should also be completed. The audiometric examination should be administered only by trained, competent personnel, and the test results interpreted by a competent otologist.

The frequencies monitored by audiometry should cover the range of 250 Hz through 8,000 Hz. Factors which may alter audiometric test results include the following:

1. faulty equipment
2. inaccurate or misunderstood instructions from the test operator
3. wax in the ears
4. head cold or allergy
5. exposure to intense noise within 18 hours or less prior to the test

Signs and Symptoms

Early signs of hearing loss are:

1. inability to understand spoken words in a noisy environment
2. need to look at the person speaking to understand words
3. familiar music may not sound the same
4. changes occur in routine audiometric examination

NOTE: The American Academy of Ophthalmology and Otolaryngology Guide for Determining Hearing Impairment is a useful guide for assessing handicaps due to hearing loss.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

NOISE IN THE WORK ENVIRONMENT

See Decision-Making Process

Measurement Methods

The current basis for evaluating continuous industrial noise exposures is the A-weighted sound level measurement. The A-weighted network is one of the several standardized frequency weighting networks on most sound measuring equipment. The A-scale is thought to rate noise in a similar manner as the human ear. Measurements are A-weighted, slow response for the evaluation of continuous noise. If only octave band analyses are available, equivalent A-weighted levels can be calculated for comparison to current standards. .

There is a wide variety of instrumentation available for the evaluation of noise from very simple equipment to extremely sophisticated equipment used by acoustical engineers and consultants. The Occupational Safety and Health Act (OSHA) proposes that noise level measurements for steady-state or continuous noise be made "with a sound level meter confirming as a minimum to the requirements of the ANSI Z1.4-1971, Type 2, and set to an A-weighted slow response or with an audio-dosimeter of equivalent accuracy and precision." Measurements should be taken as close as possible to the hearing zone of the worker whose noise exposure is being evaluated.

For the measurement of impact noise (such as that from a drop hammer), an impact noise meter with peak hold capability should be used. This type meter should conform to the requirements of ANSI Z1.4-1971, Type 1.

Sound level measuring instrumentation should be calibrated with an acoustical calibrator the day of the study, preferably before and after the noise measurements.

Allowable Limits

The OSHA allowable limits for continuous noise are as follows:

<u>DURATION PER DAY</u> <u>HOURS</u>	<u>SOUND LEVEL dBA</u> <u>SLOW RESPONSE</u>
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

OSHA indicates that "when the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect on each.

"If the sum of the following fractions $C1/T1 + C2/T2 + \dots Cn/Tn$ exceeds unity, then the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level."

The OSHA allowable limit for impact noise is that impact noise should not exceed 140 dB peak sound pressure level.

See references 69-80, Toxicological Data, Appendix D.

CONCLUSION

A careful otologic examination and hearing evaluation as outlined above are necessary for an accurate diagnosis. Criteria for diagnosing occupational hearing loss due to exposure to noise include the following:

1. time and nature of onset of the loss
2. pattern of hearing loss for different frequencies
3. confirmed history of occupational exposure of many months or years to noise level in excess of accepted standards

4. clinical findings of otologic examination and
medical history

Functional hearing impairment exists when there is no organic cause for the apparent deafness, and the inability to hear results chiefly from psychological or emotional factors.

Acoustic trauma is hearing loss resulting from a loud noise, such as an accidental explosion. If the causative noise occurs on the job, the hearing loss would be occupational.

SILICA

INTRODUCTION

This guide refers to crystalline silica (silicon dioxide) which is a naturally occurring mineral in almost all rocks. It occurs with various crystalline forms, such as cristobalite, tridymite, and quartz. Inhalation of silica dust particles small enough to enter and be retained in the lungs, over a prolonged period of time and in significant concentration, can produce the disease silicosis. It is a pneumoconiosis characterized by the growth of fibrous nodules in the lungs (nodular pulmonary fibrosis).

The latent period for development of silicosis is usually 4 to 20 years or more. There is, however, another form of silicosis, acute silicosis which occurs sporadically among heavily exposed groups of workers, with duration of exposure of less than one year.

At least 40 other diseases may resemble early silicosis by chest X-ray and lung function tests. Six of the more common diseases that must be differentiated from early silicosis include:

1. miliary tuberculosis
2. sarcoidosis
3. idiopathic pulmonary fibrosis of the Haman-Rich type
4. rheumatoid or sclerodermic lung
5. endogenous hemosiderosis due to mitral stenosis
6. metastatic neoplastic dissemination

For this reason, a differential diagnosis based on competent medical evaluation is essential to verify the presence of silicosis, along with evidence of exposure to silica. (A differential diagnosis is a comparison of the signs and symptoms of two or more similar diseases in order to determine which disease is present.)

If chest X-ray and lung function tests have not called attention to an underlying disease process, the initial symptom or complaint is shortness of breath (dyspnea) upon exertion.

Usually there are no other symptoms in the very early stages of silicosis. If cough with sputum (productive cough) is present, it is usually indicative of a bronchitis and appears in advanced stages of the disease. In those cases where the bronchitis appears early, it is frequently caused by smoking or other environmental conditions.

Despite the limitations of chest X-rays, they are used to demonstrate lung lesions and classify them according to the ILO/UC scheme (see Appendix B). In conjunction with other tests, they are useful in diagnosing and following the progression of silicosis.

Common names of some minerals containing varying amounts of silica:

free silica	chert	amethyst
quartz	sandstone	chalcedony
silicicanhydride	gritstone	chrysoprase
cristobalite	ganister	citrané quartz
tridymite	quartzite	feldspar
sand	jasper	muscovite
flint	opal	pegmatite
granite	tripoli	
beach sand	agate	rock crystal
diatomaceous earth (calcined)		rose quartz
		sardonyx
		silica flour

In addition, silica is often found associated with other minerals, and may be encountered in mining, drilling, quarrying, etc.

Occupations with Potential Exposures to Silica

ABRASIVE BLASTERS	MORTAR MAKERS
ABRASIVES MAKERS	MOTORMAN
ASPHALT MIXERS	OIL PURIFIERS
DISQUE-KILN WORKERS	OILSTONE WORKERS
BRICK LAYERS	OPTICAL EQUIPMENT MAKERS
BRICK MAKERS	PAINT MIXERS
BUHRSTONE WORKERS	POLISHING SOAP MAKERS
BUFFERS	PORCELAIN WORKERS
CARBORUNDUM MAKERS	POTTERY WORKERS
CASTING CLEANERS (FOUNDRY)	POUNCERS (FELT HAT)
CEMENT MAKERS	PULPSTONE WORKERS
CEMENT MIXERS	QUARRY WORKERS
CERAMIC WORKERS	QUARTZ WORKERS
CHEMICAL GLASS MAKERS	REFRACTORY MAKERS
CHIPPERS	ROAD CONSTRUCTORS
COAL MINERS	ROCK CRUSHERS
CONSTRUCTION WORKERS	ROCK CUTTERS
COSMETICS MAKERS	ROCK DRILLERS
CUTLERY MAKERS	ROCK GRINDERS
DIATOMACEOUS EARTH CALCINERS	ROCK SCREENERS
ELECTRONIC EQUIPMENT MAKERS	RUBBER COMPOUND MIXERS
ENAMELLERS	SANDBLASTERS
FERTILIZER MAKERS	SAND CUTTERS
FETTLERS	SANDPAPER MAKERS
FLINT WORKERS	SAND PULVERIZERS
FOUNDRY WORKERS	SANDSTONE GRINDERS
FURNACE LINERS	SAWYERS
FUSED QUARTZ WORKERS	SCOURING SOAP WORKERS
GLASS MAKERS	SILICA BRICK WORKERS
GLAZE MIXERS (POTTERY)	SILICON ALLOY MAKERS
GRANITE CUTTERS	SILVER POLISHERS
GRANITE WORKERS	SLATE WORKERS
GRINDING WHEEL MAKERS	SMELTERS
GRINDSTONE WORKERS	SODIUM SILICATE MAKERS
HARD ROCK MINERS	SPACECRAFT WORKERS
INSECTICIDE MAKERS	STONE BEDRUBBERS
INSULATORS	STONE CUTTERS
JEWELERS	STONE PLANERS
JUTE WORKERS	STREET SWEEPERS
KILN LINERS	SUBWAY CONSTRUCTION WORKERS
LITHOGRAPHERS	TILE MAKERS
MASON	TOOTH PASTE MAKERS
METAL BUFFERS	TUBE MILL LINERS
METAL BURNISHERS	TUMBLING BARREL WORKERS
METAL POLISHERS	TUNNEL CONSTRUCTION WORKERS
MINERS	WHESTONE WORKERS
	WOOD FILLER WORKERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. a respiratory questionnaire such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms:
 - a. breathlessness
 - b. phlegm (sputum) production
 - c. chest pain
 - d. cough
 - e. wheezing

Personal History

It must also be remembered that silicosis develops after long-term (years) exposure to dusts containing free silica. Any nonoccupational exposure would also have to be of such a nature as to allow prolonged exposure. Such nonoccupational exposures include:

1. agriculture and farming
2. ceramics, pottery and related hobbies
3. work with plasters, mortars, cements, etc. with high silica content
4. rock working hobbies (carving, cutting, chiseling, etc.)

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Simple Silicosis

Simple silicosis is usually without symptoms, and generally the only finding is nodulation of the lungs as seen on a chest X-ray. There is usually no loss of pulmonary function. Approximately 20 to 30 percent of the persons with simple silicosis go on to develop complicated silicosis.

Signs and Symptoms--Complicated Silicosis

1. cough and sputum (productive cough)
2. wheezing
3. shortness of breath on exertion
4. vague chest pain
5. inflammation of the bronchi (bronchitis) and emphysema frequently occur
6. increased chest diameter
7. prolonged expiration
8. cardio-respiratory failure with:
 - a. change in skin color to bluish, grayish, slate-like, or dark purple (cyanosis)
 - b. distended neck veins
 - c. excessive fluid in the hands, arms, feet and legs (peripheral edema)
 - d. enlarged liver and spleen

Signs and Symptoms--Tuberculosilicosis

Tuberculosis is a common complication in persons with silicosis. It has the same signs and symptoms as complicated silicosis (above), with marked emphysema and evidence of infection. In addition, there is:

1. rapid weight loss
2. fever

3. sputum may be blood streaked
4. tubercle bacilli found in sputum or gastric contents

LABORATORY EVALUATION

See Decision-Making Process

Additional examinations that will assist in making the diagnosis are:

1. Chest X-ray--the following findings are seen in the progression of silicosis:
 - a. simple silicosis: discrete nodular shadows are seen
 - b. complicated silicosis: fusion of two or more parts to form opaque areas or spots (coalescence to form opacities)
 - c. tuberculosilicosis: progression to solidification of lung tissue due to enlargement (consolidation)

Radiographs should be classified by the ILO/UC scheme (see Appendix B).

NOTE: X-ray findings alone cannot be the basis of diagnosis of silicosis, as many other diseases produce similar X-ray findings, but most worker's compensation insurance acts use X-ray criteria for compensation purposes.

2. Lung function tests--
 - a. reduced forced vital capacity (FVC)
 - b. decreased FEV-1
 - c. reduced diffusing capacity (DL)
 - d. reduced maximal breathing capacity

NOTE: These test results indicate impairment of the lungs; there are no lung function tests which specifically assay for silica.

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

Development of acute silicosis has been seen in sandblasting, sand pulverizing, rock drilling in quarries and tunnels, lens grinding and the manufacture of abrasive soaps.

SILICA IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis for Silica

The toxicity of a dust containing silica depends on the amount of dust in the air and the amount of silica in the dust. Thus, sampling and analysis must measure both the amount of dust in air and the silica content of the dust.

Current practice is to collect dust by filtration with analysis by weighing. The samples may be either for total dust (all particle sizes) or only for respirable particle sizes. Only the respirable fraction is significant in producing silicosis. These results are reported as milligrams dust per cubic meter of air.

Before 1970, air samples were collected in impingers and the number of particles collected were counted by the standard U.S. Public Health Service method. These results were reported as millions of particles per cubic foot of air.

The three methods of analysis commonly used for the silica content of the dust are X-ray diffraction, infrared spectroscopy, and colorimetry (Talvitii method). Current practice prefers determining the percent free silica in the dust from the collected air, but historically it was determined from "grab" samples of settled dust in the general area where the air samples were taken.

The above methods are not intended to be exclusive, but other methods should be justified.

Allowable Limits

The OSHA limits for dusts containing greater than one percent of silicon dioxide (SiO_2) are calculated from the following formula:

quartz (respirable mass fraction)

(microscopic counting)

$$\frac{250^*}{\% \text{ SiO}_2 + 5} \quad \text{million particles per cubic foot}$$

quartz (respirable mass fraction)

(gravimetric analysis)

$$\frac{10^{**}}{\% \text{ SiO}_2 + 2} \quad \text{milligrams per cubic meter}$$

quartz (total dust)

(gravimetric analysis)

$$\frac{30}{\% \text{ SiO}_2 + 2} \quad \text{milligrams per cubic meter}$$

cristobalite

$\frac{1}{2}$ the value calculated from the mass or count formula for quartz

tridymite

$\frac{1}{2}$ the value calculated from the mass or count formula for quartz

See References 81-86, Toxicological Data, Appendix D.

*The percent of crystalline silica in the formula is the amount determined from airborne samples except in those instances in which other methods have been shown to be applicable.

**Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size selector with the following characteristics:

AERODYNAMIC DIAMETER

<u>(um)</u>	<u>(unit density sphere)</u>	<u>PERCENT PASSING SELECTOR</u>
2.0		90
2.5		75
3.5		50
5.0		25
10.0		0

CONCLUSION

Diagnostic criteria for occupational silicosis are based on meeting the following:

1. confirmed history of occupational exposure to free silica of:
 - a. a particle size capable of producing the disease (pathologic)
 - b. sufficient intensity of exposure (see Silica in the Work Environment)
 - c. sufficient duration of exposures (see Silica in the Work Environment)
2. X-ray findings as outlined above (in accordance with ILO/U/C Classification--Appendix B).
3. Clinical findings compatible with silicosis as outlined above.
4. Lung function test results that are indicative of respiratory dysfunction associated with the formation of fibrous tissue within the tissue spaces (interstitial fibrosis).
5. The presence of silica in lung tissue and lymph nodes is indicative of exposure only.

SULFUR DIOXIDE

INTRODUCTION

Sulfur dioxide is used in industry in both liquid and gaseous form. Contact with liquid sulfur dioxide causes severe skin burns and eye burns which are especially dangerous. At first the eye burns are painless, but over days, weeks or months, the cornea becomes opaque, with possible scarring and adhesion of the conjunctiva (membrane lining the eye and eyelids). Blindness can result.

Exposure to sulfur dioxide gas may be acute or chronic. Most workers initially exposed to sulfur dioxide gas experience some discomfort of the mucous membranes of the upper respiratory tract and the eyes. With daily exposure this subsides and is referred to as a period of acclimatization.

The acute effects of exposure are a choking sensation, eye irritation, and watery discharge from the nose (rhinorrhea). People cannot long tolerate these symptoms, and flee from the workplace.

After acute exposure there may be mucous secretions of the respiratory tract. If the exposure is extreme or catastrophic, death may occur immediately or a chemical bronchopneumonia (bronchiolitis obliterans) may develop and cause death in a few days. Bronchial asthma can occur.

Industrial exposures to sulfur dioxide are usually chronic in nature. Symptoms that may be found over a prolonged period of exposure to higher than recommended concentrations are those resulting from mucous membrane irritation. Those exposed to higher concentrations may complain of dyspnea on exertion and increased fatigue. Most persons adapt and develop no permanent injury from levels of exposure under the maximum recommended limits.

The systemic toxic action of sulfur dioxide affects the metabolism of protein and carbohydrate and may result in vitamin B and C deficiency. "Inhibition of thyroid function, and in women, menstrual disorders may be observed." (International Labor Office. 1972. Encyclopedia of Occupational Health and Safety. New York: McGraw-Hill.) It may also have an effect on the hemopoietic system, i.e., the formation of blood cells. Ten to 20 percent of the healthy population may have a hypersensitivity to sulfur dioxide and exhibit an allergic response after exposure.

Sulfur dioxide is also referred to as:

sulfurous acid anhydride
sulfurous anhydride
sulfurous oxide

Occupations with Potential Exposures to Sulfur Dioxide

ALKALI-SALT MAKERS	INSECTICIDE MAKERS
BET SUGAR BLEACHERS	LEAD SMELTERS
BLAST FURNACE WORKERS	MAGNESIUM FOUNDRY WORKERS
BOILER WATER TREATERS	MEAT PRESERVERS
BONE EXTRACTORS	MERCURY SMELTERS
BREWERY WORKERS	METAL REFINERS
BRICKMAKERS	OIL BLEACHERS
BROOMMAKERS	OIL PROCESSORS
CONE OVEN WORKERS	ORE SMELTING WORKERS
CARBOLIC ACID MAKERS	ORGANIC SULFONATE MAKERS
CELLULOSE MAKERS	PAPER MAKERS
COPPER SMELTERS	PETROLEUM REFINERY WORKERS
DIESEL ENGINE OPERATORS	POTTERY WORKERS
DIESEL ENGINE REPAIRMEN	PRESERVATIVE MAKERS
DISINFECTANT MAKERS	PROTEIN MAKERS (FOOD)
DISINFECTORS	PROTEIN MAKERS (INDUSTRIAL)
DYE MAKERS	PYRITES BURNERS
EXTERMINATORS	REFRIGERATION WORKERS
FEATHER WORKERS	SODIUM SULFITE MAKERS
FERTILIZER MAKERS	STORAGE BATTERY CHARGERS
FLOUR BLEACHERS	STRAW BLEACHERS
FLUE CLEANERS	SUGAR REFINERS
FOOD BLEACHERS	SULFITE MAKERS
FOUNDRY WORKERS	SULFUR DIOXIDE WORKERS
FRUIT BLEACHERS	SULFURERS (MALT AND HOPS)
FRUIT PRESERVERS	SULFURIC ACID MAKERS
FUMIGANT MAKERS	TANNERY WORKERS
FUMIGATORS	TEXTILE BLEACHERS
FURNACE OPERATORS	THERMOMETER MAKERS (VAPOR PRESSURE)
GALVANIZERS	THIONYL CHLORIDE MAKERS
GELATIN BLEACHERS	VEGETABLE PRESERVERS
GLASS MAKERS	VULCANIZERS
GLUE BLEACHERS	WICKER WARE BLEACHERS
GRAIN BLEACHERS	WINE MAKERS
HEAT TREATERS (MAGNESIUM)	WOOD BLEACHERS
ICE MAKERS	WOOD PULP BLEACHERS
	ZINC SMELTERS

MEDICAL EVALUATION

See Decision-Making Process

In addition, the following should be considered:

6. any history of past disease of the eye or the cardio-pulmonary system (of the heart and/or lungs) should be carefully evaluated to determine if present symptoms are, in fact, associated with a previous disease or injury.
7. a respiratory questionnaire, such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms, such as:
 - a. breathlessness
 - b. sputum production
 - c. chest pain
 - d. cough
 - e. wheezing

Occupational History

Exposure to sulfur dioxide may be from a hobby or from home activities. Included are the following:

1. air pollution (large cities, industrial areas)
2. volunteer firemen

CLINICAL EVALUATION

See Decision-Making Process

Signs and Symptoms--Acute Sulfur Dioxide Poisoning

1. choking sensation
2. eye irritation
3. lacrimation
4. dryness or burning of the nose and throat
5. cough
6. rhinorrhea

7. hypersensitive individuals will develop urticarial skin eruption and swelling of the eyelids

Signs and Symptoms--Chronic Sulfur Dioxide Poisoning

1. irritation of the upper respiratory tract
2. cough
3. epistaxis
4. feeling of constriction in the chest
5. hemoptysis
6. nasal discharge
7. expectoration
8. common colds of longer duration
9. nasopharyngitis
10. alteration of the sense of taste and smell
11. high pitched rales in the chest
12. signs of bronchopneumonia or other chest pathology
13. loss of tooth brilliance, enamel streaking and yellow discoloration
14. disorders of the gums and surrounding tissues

LABORATORY EVALUATION

See Decision-Making Process

Additional tests which may be helpful in assessing any effects of exposure to sulfur dioxide include:

4. lung function tests
 - a. reduction of vital capacity (VC)
 - b. increased residual volume (RV)
 - c. decreased pulmonary function
5. chest X-ray
 - a. enlarged, dense hilar shadows and dense reticulations

- b. X-ray findings compatible with bronchiectasis, pulmonary edema, emphysema, bronchiolitis obliterans, asthma

Additional test results which will assist in arriving at a correct diagnosis are:

6. thyroid function may be decreased
7. increased urinary sulphate
8. increased urinary acidity

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

SULFUR DIOXIDE IN THE WORK ENVIRONMENT

See Decision-Making Process

Air Sampling and Analysis

Three commonly used sampling and analytical procedures for sulfur dioxide are:

1. West-Gaeke method (dichlorosulfite mercurate method)--collection of samples in impingers or fritted bubblers using sodium tetrachloromercurate solution as the collecting medium and subsequent analysis (after treating of the sample with a reagent) spectrophotometrically.
2. Hydrogen peroxide method--collection of samples in impingers using 0.03 N H_2O_2 solution as the collecting medium and subsequent analysis either by titration with 0.005 N barium perchlorate (Thorin indicator), or by measuring electrical conductivity.
3. Starch titration--collection of samples in two impingers (the first containing KI solution, the second sodium thiosulfate solution), and analysis by titration with 0.01 N sodium thiosulfate (starch indicator).

There are also available a number of direct reading field instruments for the determination of sulfur dioxide in the air. These include detector tubes and sulfur dioxide monitors. There are over 60 different types of monitors commercially available using 13 different principles of operation.

The above methods are not intended to be exclusive, but other methods should be justified.

Allowable Exposure Limits

The Occupational Safety and Health Act (OSHA) limits exposure to sulfur dioxide to five parts per million parts of air by volume based on an eight hour time-weighted average exposure.

See References 87-94, Toxicological Data, Appendix D.

CONCLUSION

It is difficult to attribute observed symptoms specifically to sulfur dioxide exposure since it is frequently associated with other atmospheric contaminants in industry.

Diagnosis of occupational disease due to sulfur dioxide exposure rests on meeting the following composite pictures:

1. confirmed history of occupational exposure to sulfur dioxide
2. clinical findings comparable to those outlined above
3. lung function test results indicating lung impairment
4. increased urinary sulfate ion concentration is not diagnostic but may indicate degree of exposure

TOLUENE DIISOCYANATE

INTRODUCTION

Toluene diisocyanate (TDI) is a liquid used in the manufacture of polyurethane. The liquid, vapor and aerosol forms are powerful irritants to all tissue.

Skin contact with liquid toluene diisocyanate causes inflammation which may lead to a chemical dermatitis. Liquid in the eyes causes severe irritation with lacrimation (watering of the eyes). A chemical conjunctivitis with swelling of the cornea can result from exposure to the vapor.

The vapor is a potent respiratory irritant and sensitizer. In some cases where sensitization has occurred, violent respiratory symptoms can develop on exposure to very low concentrations. It is not now known if all or only some people may become sensitized.

The irritating effects of TDI include rhinitis (inflammation of the mucous membrane lining the nose), pharyngitis, (inflammation of the pharynx), bronchitis, and in severe exposure, inflammation of the bronchioles. Occasionally the onset is with an attack of asthma. Usually the signs and symptoms of chest involvement subside when the exposure ceases. However, there is evidence that lung ventilatory capacity may be impaired in TDI foam workers even though they were symptomless and the maximum permissible concentrations had not been exceeded. Cigarette smokers and those with chronic lung disease show greater impairment.

Medical surveillance with frequent lung function tests, because of respiratory tract involvement, and eosinophil counts because of the allergenic properties of toluene diisocyanate are useful.

Occupations with Potential Exposures to Toluene Diisocyanate

ABRASION RESISTANT RUBBER MAKERS
ADHESIVE WORKERS
AIRCRAFT BURNERS
FOUNDRY WORKERS (CORE MAKING)
INSULATION WORKERS
ISOCYANATE RESIN WORKERS
LACQUER WORKERS
MINE TUNNEL COATERS
NYLON 6 MAKERS
ORGANIC CHEMICAL SYNTHESIZERS
PLASTIC FOAM MAKERS
PLASTICIZER WORKERS
POLYURETHANE FOAM MAKERS
POLYURETHANE FOAM USERS
POLYURETHANE SPRAYERS
SHIP BURNERS
SHIP WELDERS
SPRAY PAINTERS
TEXTILE PROCESSORS
TDI WORKERS
UPHOLSTERY MAKERS
WIRE COATING WORKERS

MEDICAL EVALUATION

See Decision-Making Process

Medical History

In addition, the following should be considered:

6. persons with any history of the following are at increased risk from inhalation of toluene diisocyanate:
 - a. cigarette smoking
 - b. respiratory allergy
 - c. chronic obstructive lung disease
 - d. chronic bronchitis
 - e. emphysema
 - f. cardiopulmonary disease
7. a respiratory questionnaire, such as that in Appendix B, can be useful in evaluating the extent and importance of respiratory symptoms, such as:
 - a. breathlessness
 - b. sputum production
 - c. chest pain
 - d. cough
 - e. wheezing

Occupational History

The results of any pre-employment and/or periodic lung function tests as well as blood count and chemistry tests should be evaluated.

CLINICAL EVALUATION

See Decision-Making Process

The reactions encountered with inhalation of TDI vapor are:

1. primary irritation to which all exposed persons are susceptible to some degree

2. sensitization reaction, which occurs at much lower exposures in persons who have become sensitized to TDI during earlier exposure

Signs and Symptoms--Primary Irritation

Inhaled toluene diisocyanate vapor causes:

1. burning of eyes, nose and throat
2. dry, sore throat
3. choking sensation
4. nasal congestion
5. paroxysmal cough (cough which may occur in sudden, periodic attacks)
6. chest pain may occur

If the TDI vapor concentration is high enough, the effects may progress to a chemical bronchitis with the following:

7. severe bronchospasm
8. feeling of tightness in chest
9. rales and rhonchi

This high dose response may follow a clinical course similar to that of broncho-pneumonia from bacterial infection. In addition, the following may occur:

10. pulmonary edema (excess fluid in the lungs)
11. headache
12. insomnia
13. neurological (nervous) and psychiatric (mental) symptoms.

Signs and Symptoms--Sensitization Reaction

1. onset (usually without realization) of respiratory problems which become progressively worse with continuous exposure to TDI
2. shortness of breath occurring at night (nocturnal dyspnea) and/or nocturnal cough followed by development of asthmatic bronchitis

3. exposure of sensitized persons to TDI, even at low levels, can promote a severe asthmatic attack, and may cause death

In some instances, workers with only minimal respiratory symptoms or no apparent effects for several weeks at low level exposure may suddenly develop an acute asthmatic attack.

Acute respiratory effects from TDI exposure are often completely reversible, but continued exposure of affected workers to TDI vapor may result in:

4. asthmatic bronchitis
5. broncho-pneumonia
6. chronic bronchitis, emphysema and corpulmonale (right heart failure)

LABORATORY EVALUATION

See Decision-Making Process

Additional tests that will assist in arriving at a correct diagnosis are:

3. Lung Function Tests--
 - a. there is a decrease in the forced expiratory volume at one second (FEV₁)
 - b. forced vital capacity (FVC) is decreased
4. Chest X-ray--findings are nonspecific. Corresponding changes will be seen if there is a bronchopneumonia or pulmonary edema (excessive fluids in the lungs)
5. absolute eosinophil count often is increased
6. white blood count may be slightly increased
7. lymphocyte transformation test is positive in sensitized persons

EPIDEMIOLOGICAL FINDINGS

See Decision-Making Process

TOLUENE DIISOCYANATE IN THE WORK ENVIRONMENT

See Decision-Making Process

Sampling and Analysis

The two most commonly used methods for the collection of air samples for toluene diisocyanate are:

1. the Ranta method
2. the Marcali method

These methods are not intended to be exclusive, but other methods should be justified.

There are also available a number of field instruments for the determination of TDI concentrations in air. Many of them are based on modifications of the Marcali sampling method.

Allowable Exposure Limits

The Occupational Safety and Health Act (OSHA) limits exposure to toluene diisocyanate to 0.02 parts per million parts of air by volume. This is a Ceiling Limit which should never be exceeded.

See References 95-103, Toxicological Data, Appendix D.

CONCLUSION

Diagnostic criteria for occupational toluene diisocyanate poisoning are based on meeting the following:

1. confirmed history of occupational exposure to TDI vapor
2. clinical findings compatible with the respiratory syndrome as outlined above.
3. progressive decrease in lung capacity
4. progressive increase in eosinophil count

SECTION 3. APPENDICES

APPENDIX A.

BIOLOGICAL CHARACTERISTIC DATA

BIOLOGICAL MONITORING

Biological monitoring is the periodic monitoring of blood, urine, or other specimens to detect excessive absorption of a potentially harmful substance. Such tests are not diagnostic, but are performed to limit exposure before harmful effects occur.

Normal Values for Biological Monitoring

<u>Agent</u>	<u>Estimated As</u>	<u>Suggested Maximum Concentration</u>	<u>Biological Material</u>
Antimony ³	Antimony	1 mg/liter	urine
Arsenic ⁴	Arsenic	0.02 mg/liter	urine
Arsenic ⁷	As	0.02-3.5 ppm	fingernails
Arsenic ⁷	As	0.52-5.6 ppm	toenails
Benzene ²	Phenol	75.0 mg/liter	urine
Benzene ¹	Conjugated Sulfates	70%	urine
Carbon Monoxide ³	Carboxyhemoglobin	10%	blood
Carbon Monoxide ¹	Carbon Monoxide	3 ml%	blood
Carbon Monoxide ¹	Carbon Monoxide	0.14%	expired air
Chromium ⁵	Chromium	3.77 µg/liter	urine (14 hour)
Chromium ⁵	Chromium	2.65 µg/100 g.	blood
Lead ¹	Lead	0.15 mg/liter	urine (24 hour)
Lead ¹	Lead	0.08 mg/liter	blood
Lead ¹	Coproporphyrin	0.10 mg/liter	urine
Lead ⁶	Delta-Aminolevulinic Acid	1.3-7.0 mg/ 24 hour	urine

Blood Chemistry

Normal Laboratory Values

Calcium ⁸	9-11mg/100ml
Inorganic phosphorus	2-4.5mg/100ml
Glucose, True (fasting)	70-110mg/100ml
Urea nitrogen	10-20mg/100ml
Uric acid - females	3-7.5mg/100ml
- males	3-8.5mg/100ml
Cholesterol	150-280mg/100ml
Total protein	6-8mg/100ml
Albumin	3.5-5.5mg/100ml
Bilirubin, Total	0.2-0.9mg/100ml
Alkaline phosphatase	2-4.5 Bodansky Units (30-85 mU/ml)
Lactic dehydrogenase ⁹	60-120 U/ml
SGOT ⁹	10-40 U/ml

Hematology Selected Values

Erythrocytes	Male	4.6-6.2 million/cu mm
	Female	4.2-5.4 million/cu mm
Leukocytes	Total	5,000-10,000/cu mm
	Differential	
	Myelocytes	0%
	Immature Polymorphonuclears	3-5%
	Segmented neutrophils	54-62%
	Lymphocytes	25-33%
	Monocytes	2-7%
	Eosinophils	1-3%
	Basophils	0-0.75%
Platelets		150,000-350,000/cu mm
Reticulocytes		0.5-1.5% of erythrocytes

Values for Erythrocytes

Mean Corpuscular Hemoglobin		27-31 picograms
Mean Corpuscular Volume		82-92 cubic micrometers
Mean Corpuscular Hemoglobin Concentration		32-36%
Hematocrit	Male	40-54%
	Female	37-47%
Hemoglobin	Male	14.0-18.0 g%
	Female	12.0-16.0 g%
Serum Bilirubin Concentration		
	Total	0.3-1.1 mg%
	Direct	0.1-0.4 mg%
	Indirect	0.2-0.7 mg%

Urinalysis

Sugar	0
Protein	0
Specific Gravity	1.003-1.030
Bilirubin	negative
Hemoglobin	negative
pH	4.6-8.0, average 6.0 (depending on diet)

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Also see:

Guides to the Evaluation of Permanent Impairment. 1971. Amer. Med. Assoc., p. 67.

APPENDIX B.
 SAMPLE RESPIRATORY QUESTIONNAIRE
 AND
 ILO U/C, 1971 INTERNATIONAL
 CLASSIFICATION OF RADIOGRAPHS OF THE
 PNEUMOCONIOSES

BRITISH RUBBER MANUFACTURERS' ASSOCIATION
QUESTIONNAIRE

Use the actual wording of each question. Put X in the appropriate space after each question. When in doubt, record "NO."

PREAMBLE: I am going to ask you some questions mainly about your chest. I should like you to answer 'YES' or 'NO' whenever possible.

- | | <u>YES</u> | <u>NO</u> | <u>N/A</u> |
|---|------------|-----------|------------|
| 1. Do you usually cough first thing in the morning or on getting up? | _____ | _____ | |
| (Count a cough with first smoke or on first going out of doors. Exclude throat clearing or a single cough.) | | | |
| 2. Do you cough like this on most days for as much as three months each year? | _____ | _____ | _____ |
| 3. Do you cough at work? | _____ | _____ | |
| 4. Do you usually bring up some phlegm from your chest first thing in the morning or on getting up? | _____ | _____ | |
| (Count phlegm with the first smoke or on first going out of doors. Exclude phlegm from the nose. Count swallowed phlegm.) | | | |
| 5. Do you bring up phlegm like this on most days for as much as three months each year? | _____ | _____ | _____ |
| 6. In the past three years, have you had a period of (increased) cough and phlegm lasting 3 weeks or more? | _____ | _____ | |

7. Have you had more than one such period? — —
8. Does your chest ever feel tight or your
breathing become difficult? — —
9. Do you get this apart from colds? — —
- If YES: specify...(Interviewer to code)
- (a) With Exercise — —
- (b) At Work — —
- (c) Any Other Time — —
- If disabled from walking by skeletal or
 other physical disability put 'X' here. —
10. Are you troubled by shortness of breath,
when hurrying on the level or walking up
a slight hill? — —
- (If 'NO' omit questions 11 and 12)
11. Do you get short of breath walking with
other people of your own age on level
ground? — —
- (If 'NO' omit question 12)
12. Do you have to stop for breath when walking
at your own pace on level ground? — —
13. Do you usually have a stuffy nose or
catarrh at the back of your nose in the
winter? — —
14. Do you have this in the summer? — —
- (If 'NO' to both questions 13 and 14,
 go to question 16)

15. Do you have this on most days for as much
as three months each year? _____

16. During the past 3 years have you had any
chest illness which has kept you off work
or from your usual activities for as much
as a week? _____

17. Did you bring up more phlegm than usual
in any of these illnesses? _____

18. Have you had more than one illness with
phlegm like this in the last 3 years? _____

HAVE YOU EVER HAD:

(Give relevant details after each positive answer.)

19. An injury or operation affecting your
chest? _____

20. Heart trouble? _____

21. Bronchitis? _____

22. Pneumonia? _____

23. Pleurisy? _____

24. Pulmonary Tuberculosis? _____

25. Bronchial Asthma? _____

26. Eczema? _____
27. Dermatitis? _____
28. Pneumoconiosis? _____
29. Byssinosis? _____
30. Other chest troubles? _____
31. Have you ever smoked? _____

(Record 'NO' if subject has never smoked
as much as one cigarette a day, or 1 oz.
tobacco a month, for as long as one year)

32. Age when stopped _____ years. Was this
in the last month? _____

If 'YES' to 31 and 32, fill in figures
below:

	AMOUNT SMOKED	
	NOW	BEFORE STOPPING
Cigarettes/day (Average including weekends)	_____	_____
Oz. tobacco/week (handrolled)	_____	_____
Oz. tobacco/week (pipe)	_____	_____
Cigars/week (large)	_____	_____
Cigars/week (small)	_____	_____

OCCUPATION (1st Interview Only)

(Record on lines the years in which subject has worked in any of these industries, e.g., 1960-1963)

	<u>YES</u>	<u>NO</u>
33. Have you ever worked in a dusty job? _____	_____	_____
34. In a coal mine? _____	_____	_____
35. In any other mine? _____	_____	_____
36. In a quarry? _____	_____	_____
37. In a foundry? _____	_____	_____
38. In a pottery? _____	_____	_____
39. In a cotton, flax or hemp mill? _____	_____	_____

40. With asbestos? _____	_____	_____
41. In any other dusty job? _____	_____	_____
If 'YES', specify _____		

42. Have you been exposed regularly to irritating gas or chemical fumes? _____	_____	_____

If 'YES', give details of nature and duration _____		

OCCUPATION (Follow-Up only)

43. What is your present job? _____
44. How long have you been doing it? _____
45. What was your previous job in the factory? _____

Taken with minor changes from Operating and Medical Codes of Practice for Safe Working with Toluene Diisocyanate, Health Advisory Committee, British Rubber Manufacturers' Association Ltd. (81)

U.I.C.C./CINCINNATI CLASSIFICATION OF RADIOGRAPHIC
APPEARANCES OF PNEUMOCONIOSES

Slide Number	ROUNDED SMALL OPACITIES				IRREGULAR SMALL OPACITIES				LARGE OPACITIES		PLEURAL THICKENING				PLEURAL CALCIFICATION				Comments
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	1	2	3	4	
1	p/2	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
2	q/2	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
3	r/3	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
4	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
5	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
6	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
7	q/2	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
8	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
9	1/0	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
10	p/1	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓

ILO U/C 1971 International
Classification of Radiographs of the Pneumoconioses

Feature	Code			Definition
Small Opacities				
Rounded				
Type				The nodules are classified according to the approximate diameter of the predominant opacities.
	p	q(m)	r(n)	p = rounded opacities up to about 1.5 mm in diameter. q(m) = rounded opacities exceeding about 1.5 mm and up to about 3 mm in diameter. r(n) = rounded opacities exceeding about 3 mm and up to about 10 mm in diameter.
Profusion				The category of profusion is based on assessment of the concentration (profusion) of opacities in the affected zones. The Standard Radiographs define the midcategories (1/1, 2/2, 3/3).
	0/-	0/0	0/1	Category 0 = small rounded opacities absent or less profuse than in Category 1.
	1/0	1/1	1/2	Category 1 = small rounded opacities definitely present, but few in number. The normal lung markings are usually visible.
	2/1	2/2	2/3	Category 2 = small rounded opacities numerous. The normal lung markings are usually still visible.
	3/2	3/3	3/4	Category 3 = small rounded opacities very numerous. The normal lung markings are partly or totally obscured.
Extent	RU LU	RM LM	RL LL	The zones in which the opacities are seen are recorded. Each lung is divided into three zones—upper, middle, and lower.
Irregular				
Type				As the opacities are irregular, the dimensions used for rounded opacities cannot be used, but they can be roughly divided into three types.
	s	t	u	s = fine irregular, or linear, opacities. t = medium irregular opacities. u = coarse (blotchy) irregular opacities.
Profusion				The category of profusion is based on assessment of the concentration (profusion) of opacities in the affected zones. The Standard Radiographs define the midcategories (1/1, 2/2, 3/3).
	0/-	0/0	0/1	Category 0 = small irregular opacities absent or less profuse than in Category 1.
	1/0	1/1	1/2	Category 1 = small irregular opacities definitely present, but few in number. The normal lung markings are usually visible.
	2/1	2/2	2/3	Category 2 = small irregular opacities numerous. The normal lung markings are usually partly obscured.
	3/2	3/3	3/4	Category 3 = small irregular opacities very numerous. The normal lung markings are usually totally obscured.
Extent	RU LU	RM LM	RL LL	The zones in which the opacities are seen are recorded. Each lung is divided into three zones—upper, middle, and lower—as for rounded opacities.
Combined profusion	1/0 2/1 3/2	1/1 2/2 3/3	1/2 2/3 3/4	When both rounded and irregular small opacities are present, record the profusion of each separately and then record the combined profusion as though all the small opacities were of one type, i.e., either rounded or irregular. This is an optional feature of the Classification, but it is strongly recommended.
Large Opacities				
Size	A	B	C	Category A = an opacity with greatest diameter between 1 cm and 5 cm, or several such opacities the sum of whose greatest diameters does not exceed 5 cm. Category B = one or more opacities larger or more numerous than in Category A whose combined area does not exceed the equivalent of the right upper zone. Category C = one or more opacities whose combined area exceeds the equivalent of the right upper zone.
Type	wd	id		In addition to the letter A, B, or C, the abbreviation "wd" or "id" should be used to indicate whether the opacities are well defined or ill defined.
Pleural Thickening				
Costo- angle	R	L		Obiteration of the costophrenic angle is recorded separately from thickening over other sites. A lower limit Standard Radiograph is provided.

Feature	Code	Definition
Chest wall and diaphragm		
Site	R L	
Extent	a b c	Grade a = up to about 5 mm thick at the widest part of any pleural shadow. Grade b = over about 5 mm and up to about 10 mm thick at the widest part of any pleural shadow. Grade c = over about 10 mm at the widest part of any pleural shadow.
Extent	0 1 2	Grade 0 = not present or less than Grade 1. Grade 1 = definite pleural thickening in one or more places such that the total length does not exceed one half of the projection of one lateral wall. The Standard Radiograph defines the lower limit of Grade 1. Grade 2 = pleural thickening greater than Grade 1
Defined Diaphragm	R L	The lower limit is one third of the affected hemidiaphragm. A lower limit Standard Radiograph is provided.
Defined Cardiac Outline (Shagginess)	0 1 2 3	Grade 0 = absent or up to one third of the length of the left cardiac border or equivalent. Grade 1 = above one third and up to two thirds of the length of the left cardiac border or equivalent. Grade 2 = above two thirds and up to the whole length of the left cardiac border or equivalent. Grade 3 = more than the whole length of the left cardiac border or equivalent.
Pleural Calcification		
Site	Wall Diaphragm Other R L	
Extent	0 1 2 3	Grade 0 = no pleural calcification. Grade 1 = one or more areas of pleural calcification the sum of whose greatest diameters does not exceed about 2 cm. Grade 2 = one or more areas of pleural calcification the sum of whose greatest diameters exceeds about 2 cm but not about 10 cm. Grade 3 = one or more areas of pleural calcification the sum of whose greatest diameters exceeds about 10 cm.
Additional Symbols		
	ax cp es pq bu cv hi px ca di ho rl cn ef k tba co em od tbu	ax = coalescence of small rounded pneumoconiotic opacities bu = bullae ca = cancer of lung or pleura cn = calcification in small pneumoconiotic opacities co = abnormality of cardiac size or shape cp = cor pulmonale cv = cavity di = marked distortion of intrathoracic organs ef = effusion em = marked emphysema es = eggshell calcification of hilar or mediastinal lymph nodes hi = enlargement of hilar or mediastinal lymph nodes ho = honeycomb lung k = septal (Kerley) lines od = other significant disease. This includes disease not related to dust exposure, e.g., surgical or traumatic damage to chest walls, bronchiectasis, etc. pq = pleural plaque (uncalcified) px = pneumothorax rl = rheumatoid pneumoconiosis (Caplan's syndrome) tba = tuberculosis, probably active tbu = tuberculosis, actively uncertain

APPENDIX C.

OCCUPATIONS WITH POTENTIAL EXPOSURE TO DISEASE-CAUSING AGENTS

OCCUPATION -----	AGENT(S) -----
ABRASIVE BLASTERS	SILICA
ABRASIVES MAKERS	SILICA
ABRASION RESISTANT RUBBER MAKERS	TOL. DIISOCYANATE
ACETIC ACID MAKERS	CARBON MONOXIDE
ACETYLENE WORKERS	ARSENIC
ACETYLENE PURIFIERS	CHROMIC ACID
ACID FINISHERS	LEAD
ACID DIPPER	ARSENIC NITROGEN DIOXIDE
ACOUSTICAL PRODUCT MAKERS	ASBESTOS
ACOUSTICAL PRODUCT INSTALLERS	ASBESTOS
ACTORS	LEAD
ADHESIVE WORKERS	TOL. DIISOCYANATE
ADHESIVE MAKERS	BENZENE
AIR FILTER MAKERS	ASBESTOS
AIRCRAFT BURNERS	TOL. DIISOCYANATE
AIRPLANE DOPE MAKERS	BENZENE
AIRPLANE PILOTS	CARBON MONOXIDE
ALCOHOL WORKERS	BENZENE

OCCUPATION -----	AGENT(S) -----
ALKALI-SALT MAKERS	SULFUR DIOXIDE
ALLOY MAKERS	ARSENIC
ALUMINUM ANODIZERS	CHROMIC ACID
ALUMINUM HARD COATERS	CHROMIC ACID
AMMONIA MAKERS	CARBON MONOXIDE
ANILINE MAKERS	BENZENE NITROGEN DIOXIDE
ANILINE COLOR MAKERS	ARSENIC
ANILINE WORKERS	ARSENIC
ANTIMONY ORE SMELTERS	ANTIMONY
ANTIMONY WORKERS	ANTIMONY
ARC WELDERS	CARBON MONOXIDE
ARSENIC WORKERS	ARSENIC
ARSINE WORKERS	ARSENIC
ART GLASS WORKERS	BENZENE
ARTIFICIAL FLOWER MAKERS	ARSENIC
ARTIFICIAL LEATHER MAKERS	BENZENE
ARTIFICIAL ABRASIVE MAKERS	CARBON MONOXIDE
ARTIFICIAL GAS WORKERS	CARBON MONOXIDE

OCCUPATION -----	AGENT(S) -----
ASBESTOS-CEMENT PRODUCTS MAKERS	ASBESTOS
ASBESTOS-CEMENT PRODUCTS USERS	ASBESTOS
ASBESTOS-COATINGS MAKERS	ASBESTOS
ASBESTOS-COATINGS USERS	ASBESTOS
ASBESTOS-GROUT MAKERS	ASBESTOS
ASBESTOS-GROUT USERS	ASBESTOS
ASBESTOS-MILLBOARD MAKERS	ASBESTOS
ASBESTOS-MILLBOARD USERS	ASBESTOS
ASBESTOS-MORTAR MAKERS	ASBESTOS
ASBESTOS-MORTAR USERS	ASBESTOS
ASBESTOS MILLERS	ASBESTOS
ASBESTOS MINERS	ASBESTOS
ASBESTOS-PAPER MAKERS	ASBESTOS
ASBESTOS-PAPER USERS	ASBESTOS
ASBESTOS-PLASTER MAKERS	ASBESTOS
ASBESTOS-PLASTER USERS	ASBESTOS
ASBESTOS SPRAYERS	ASBESTOS
ASBESTOS WORKERS	ASBESTOS
ASBESTOS PRODUCT INFREGNATORS	

OCCUPATION -----	AGENT(S) -----
ASPHALT MIXERS	BENZENE
AUTO GARAGE WORKERS	ASBESTOS SILICA
AUTO PAINTERS	NITROGEN DIOXIDE BENZENE
AUTOMOBILE REPAIR GARAGE WORKERS	ASBESTOS
AUTOMOBILE USERS	CARBON MONOXIDE
BABBITERS	LEAD
BABBIT METAL WORKERS	ANTIMONY ARSENIC
BAKERS	CARBON MONOXIDE
BATTERY MAKERS	LEAD
BATTERY WORKERS (STORAGE)	ANTIMONY
BATTERY (DRY) MAKERS	BENZENE
BEAMING OPERATORS (COTTON MILL)	COTTON DUST
BET SUGAR BLEACHERS	SULFUR DIOXIDE
BELT SCOURERS	BENZENE
BENZENE HEXACHLORIDE MAKERS	BENZENE
BENZENE WORKERS	BENZENE
BERYLLIUM ALLOY MACHINERS	BERYLLIUM

OCCUPATION	AGENT(S)
BERYLLIUM ALLOY MAKERS	BERYLLIUM
BERYLLIUM COMPOUND MAKERS	BERYLLIUM
BERYLLIUM-COPPER FOUNDERS	BERYLLIUM
BERYLLIUM-COPPER GRINDERS	BERYLLIUM
BERYLLIUM-COPPER POLISHERS	BERYLLIUM
BERYLLIUM EXTRACTORS	BERYLLIUM
BERYLLIUM METAL MACHINERS	BERYLLIUM
BERYLLIUM MINERAL MINERS	BERYLLIUM
BERYLLIUM PHOSPHOR MAKERS	BERYLLIUM
BERYLLIUM WORKERS	BERYLLIUM
BISQUE-KILN WORKERS	CARBON MONOXIDE SILICA
BLACKSMITHS	CARBON MONOXIDE LEAD
BLAST FURNACE WORKERS	CARBON MONOXIDE SULFUR DIOXIDE
BLAST FURNACE GAS USERS	CARBON MONOXIDE
BLEACHING POWDER MAKERS	ARSENIC
BLOCKERS (FELT HAT)	CARBON MONOXIDE
BLUEPRINTERS	NITROGEN DIOXIDE
BOILER ROOMS	

OCCUPATION -----	AGENT(S) -----
	NOISE
BOILER WATER TREATERS	SULFUR DIOXIDE
BOILER OPERATORS	ARSENIC
BOILER ROOM WORKERS	CARBON MONOXIDE
BONE EXTRACTORS	SULFUR DIOXIDE
BOOK BINDERS	ARSENIC
BOOKBINDERS	LEAD
BOTTLE CAP MAKERS	LEAD
BRAKE LINING MAKERS	ASBESTOS
BRAKELINING MAKERS	BENZENE
BRASS FOUNDERS	ANTIMONY CARBON MONOXIDE LEAD
BRASS POLISHERS	LEAD
BRASS CLEANERS	NITROGEN DIOXIDE
BRASS MAKERS	ARSENIC
BRAZIERS	LEAD NITROGEN DIOXIDE
BREWERY WORKERS	SULFUR DIOXIDE
BREWERS	CARBON MONOXIDE
RICE BURNERS	CARBON MONOXIDE

OCCUPATION	AGENT(S)
BRICK DIGGERS	LEAD
BRICKLAYERS	LEAD SILICA
BRICKMAKERS	SILICA
BRIGHT DIP WORKERS	SULFUR DIOXIDE
BRITANNIA METAL WORKERS	NITROGEN DIOXIDE
BRONZERS	ANTIMONY
BRONZE CLEANERS	ANTIMONY ARSENIC BENZENE LEAD
BRONZE MAKERS	NITROGEN DIOXIDE
BROOMMAKERS	ARSENIC
BRUSH MAKERS	SULFUR DIOXIDE
BUFFERS	LEAD
BUHRSTONE WORKERS	SILICA
BUILDING DEMOLITION WORKERS	SILICA
BURNISHERS	ASBESTOS
BUSDRIVERS	ANTIMONY BENZENE
CABLE MAKERS	CARBON MONOXIDE
	LEAD

OCCUPATION -----	AGENT(S) -----
CABLE SPLICERS	ANTIMONY CARBON MONOXIDE LEAD
CADMIUM WORKERS	ARSENIC
CAN MAKERS	BENZENE
CANDLE (COLORED) MAKERS	ARSENIC
CANNERS	ARSENIC LEAD
CARBIDE MAKERS	CARBON MONOXIDE
CARBOLIC ACID MAKERS	BENZENE SULFUR DIOXIDE
CARBON MONOXIDE WORKERS	CARBON MONOXIDE
CARDERS (COTTON MILL)	COTTON DUST
CARDERS (ASBESTOS)	ASBESTOS
CARDING MACHINE OPERATORS (COTTON MILL)	COTTON DUST
CARPET MAKERS	ARSENIC
CARBORUNDUM MAKERS	SILICA
CARROTTERS (FELT HAT)	ARSENIC
CARTRIDGE MAKERS	LEAD
CAST SCRUBBERS (ELECTROPLATING)	BENZENE
CASTING CLEANERS (FOUNDRY)	SILICA

OCCUPATION -----	AGENT(S) -----
CATHODE RAY TUBE MAKERS	BERYLLIUM
CATTLE DIP WORKERS	ARSENIC
CAULKING COMPOUND MAKERS	ASBESTOS
CAULKING COMPOUND USERS	ASBESTOS
CELLULOID MAKERS	NITROGEN DIOXIDE
CELLULOSE MAKERS	SULFUR DIOXIDE
CEMENT MAKERS	CARBON MONOXIDE SILICA
CEMENT MIXERS	SILICA
CERAMIC MAKERS	ANTIMONY ARSENIC BERYLLIUM LEAD
CERAMIC WORKERS	SILICA
CERAMIC ENAMEL WORKERS	ARSENIC
CHARCOAL BURNERS	CARBON MONOXIDE
CHAUFFERS	CARBON MONOXIDE
CHEMICAL EQUIPMENT MAKERS	LEAD
CHEMICAL PRODUCTS MANUFACTURE	NOISE
CHEMICAL GLASS MAKERS	SILICA
CHIMNEY MASONS	CARBON MONOXIDE

OCCUPATION -----	AGENT(S) -----
CHIMNEY SWEEPERS	CARBON MONOXIDE
CHIPPERS	LEAD SILICA
CHLORINATED PARAFFIN MAKERS	LEAD
CHLOROBENZENE MAKERS	BENZENE
CHLORODIPHENYL MAKERS	BENZENE
CHROME PLATERS	BERYLLIUM CHROMIC ACID
CHROMIC ACID MAKERS	CHROMIC ACID
CIGAR MAKERS	LEAD
CLEANER OPERATORS (COTTON MILL)	COTTON DUST
CLEANERS (COTTON MILL)	COTTON DUST
CLUTCH FACING MAKERS	ASBESTOS
CLUTCH DISC IMPREGNATORS	BENZENE
COAL MINERS	SILICA
COAL TAR REFINERS	BENZENE
COAL TAR WORKERS	BENZENE
COAL DISTILLERS	CARBON MONOXIDE
COBBERS (ASBESTOS)	ASBESTOS
COBBLERS	BENZENE

OCCUPATION -----	AGENT(S) -----
COKE OVEN DOOR CLEANERS-LUTERMAN	COKE OVEN EMISSIONS
COKE OVEN DOOR MACHINE OPERATORS	COKE OVEN EMISSIONS
COKE OVEN HEATER	COKE OVEN EMISSIONS
COKE OVEN LARRY CAR OPERATORS	COKE OVEN EMISSIONS
COKE OVEN LIDHEN-LARRYMEN	COKE OVEN EMISSIONS
COKE OVEN MAINTENANCE MEN	COKE OVEN EMISSIONS
COKE OVEN PATCHER	COKE OVEN EMISSIONS
COKE OVEN PUSHER OPERATORS	COKE OVEN EMISSIONS
COKE OVEN QUENCH CAR OPERATORS	COKE OVEN EMISSIONS
COKE OVEN TAR CHASER	COKE OVEN EMISSIONS
COKE OVEN WORKERS	BENZENE CARBON MONOXIDE SULFUR DIOXIDE
COLORLESS GLASS MAKERS	CHROMIC ACID
COMBING MACHINE OPERATORS (COTTON MILL)	COTTON DUST
COMPOSITORS	ANTIMONY
COMPRESSED AIR WORKERS	CARBON MONOXIDE
COMPUTER PARTS MAKERS	BERYLLIUM
CONSTRUCTION	NOISE
CONSTRUCTION WORKERS	

OCCUPATION	AGENT(S)
	ASBESTOS SILICA
COPPER CLEANERS	NITROGEN DIOXIDE
COPPER SMELTERS	ARSENIC SULFUR DIOXIDE
COPPER REFINERS	ANTIMONY
COPPER STRIPPERS	CHROMIC ACID
CORROSION INHIBITOR WORKERS	CHROMIC ACID
CORRUGATED PAPER MANUFACTURE	NOISE
COSMETICS MAKERS	SILICA
COTTON BLEACHERS	NITROGEN DIOXIDE
CROP DUSTERS	ARSENIC LEAD
CRUSHERS (ASBESTOS)	ASBESTOS
CUPOLA WORKERS	CARBON MONOXIDE
CUTLERY MAKERS	LEAD SILICA
CYCLOHEXANE MAKERS	BENZENE
DOT MAKERS	BENZENE
DECORATORS (POTTERY)	LEAD
DEFOLIANT APPLICATORS	ARSENIC
SOLVENT POWERS	

<u>OCCUPATION</u>	<u>AGENT(S)</u>
	ARSENIC
DEGREASERS	BENZENE
DEMOLITION WORKERS	LEAD
DEMOLITION	NOISE
DENTAL TECHNICIANS	LEAD
DENTAL WORKERS	NITROGEN DIOXIDE
DETERGENT MAKERS	BENZENE
DIAMOND POLISHERS	LEAD
DIATOMACEOUS EARTH CALCINERS	SILICA
DICHLOROBENZENE MAKERS	BENZENE
DIESEL EQUIPMENT OPERATORS	NITROGEN DIOXIDE
DIESEL ENGINE OPERATORS	CARBON MONOXIDE SULFUR DIOXIDE
DIESEL ENGINE REPAIRMEN	SULFUR DIOXIDE
DIMETHYLSULFATE MAKERS	ARSENIC
DIPHENYL MAKERS	BENZENE
DIPPERS (ACID)	CHROMIC ACID
DISINFECTANT MAKERS	ARSENIC BENZENE SULFUR DIOXIDE
DISINFECTORS	SULFUR DIOXIDE

OCCUPATION -----	AGENT(S) -----
DIVERS	CARBON MONOXIDE
DOCK WORKERS	CARBON MONOXIDE
DRAWING FRAME OPERATORS (COTTON MILL)	COTTON DUST
DRIER WORKERS	CARBON MONOXIDE
DRUG MAKERS	ARSENIC BENZENE
DRY CLEANERS	BENZENE
DRYER OPERATORS (COTTON MILL)	COTTON DUST
DYE MAKERS	ANTIMONY ARSENIC BENZENE LEAD NITROGEN DIOXIDE SULFUR DIOXIDE
DYERS	LEAD
EARTH MOVING EQUIPMENT OPERATORS	NOISE
ELECTRONIC DEVICE MAKERS	LEAD
ELECTROPLATERS	ANTIMONY ARSENIC BENZENE CHROMIC ACID LEAD NITROGEN DIOXIDE
ELECTROTYPERS	LEAD
ELECTRIC ARC WELDERS	NITROGEN DIOXIDE
ELECTRICAL EQUIPMENT MANUFACTURE	

OCCUPATION -----	AGENT(S) -----
	NOISE
ELECTRONIC EQUIPMENT MAKERS	SILICA
ELECTROLYTIC COPPER WORKERS	ARSENIC
ELECTRIC EQUIPMENT MAKERS	BERYLLIUM
EMBROIDERY WORKERS	LEAD
ENERGY WHEEL MAKERS	LEAD
ENAMEL BURNERS	LEAD
ENAMELERS	ARSENIC BENZENE CARBON MONOXIDE LEAD
ENAMEL MAKERS	ARSENIC LEAD
ENAMELLERS	SILICA
ENGINE ROOMS	NOISE
ENGRAVERS	BENZENE
ETCHERS	ARSENIC NITROGEN DIOXIDE
ETHYLBENZENE MAKERS	BENZENE
EXPLOSIVES MAKERS	ANTIMONY LEAD NITROGEN DIOXIDE
EXPLOSIVES USERS	NITROGEN DIOXIDE
EXPLOSIVE MAKERS	

OCCUPATION -----	AGENT(S) -----
EXTERMINATORS	BENZENE
	ARSENIC SULFUR DIOXIDE
FABRICATED METAL PRODUCT MANUFACTURE	NOISE
FARM EQUIPMENT OPERATORS	NOISE
FARMERS	ARSENIC LEAD
FEATHER WORKERS	ARSENIC BENZENE SULFUR DIOXIDE
FERROSILICON WORKERS	ARSENIC
FERTILIZER MAKERS	ARSENIC NITROGEN DIOXIDE SILICA SULFUR DIOXIDE
FETTLERS	SILICA
FIBERIZERS (ASBESTOS)	ASBESTOS
FILE CUTTERS	LEAD
FIREMEN	ASBESTOS LEAD
FIREMAN	CARBON MONOXIDE
FIREPROOFERS	ASBESTOS
FIREWORKS MAKERS	ANTIMONY ARSENIC
FISCHER-TROPSCH PROCESS WORKERS	CARBON MONOXIDE

OCCUPATION -----	AGENT(S) -----
FLAMEPROOFERS	ANTIMONY
FLINT WORKERS	SILICA
FLOUR BLEACHERS	NITROGEN DIOXIDE SULFUR DIOXIDE
FLOWER MAKERS (ARTIFICIAL)	LEAD
FLUE CLEANERS	SULFUR DIOXIDE
FLOUORESCENT SCREEN MAKERS	BERYLLIUM
FLYPAPER MAKERS	ARSENIC
FOOD PROCESSING	NOISE
FOOD BLEACHERS	SULFUR DIOXIDE
FORMALDEHYDE MAKERS	CARBON MONOXIDE
FOUNDRY WORKERS	ANTIMONY CARBON MONOXIDE LEAD SILICA SULFUR DIOXIDE
FOUNDRIES	NOISE
FOUNDRY WORKERS (CORE MAKING)	TOL. DIISOCYANATE
FRUIT BLEACHERS	SULFUR DIOXIDE
FRUIT PRESERVERS	SULFUR DIOXIDE
FUNGICIDE MAKERS	BENZENE SULFUR DIOXIDE

OCCUPATION	AGENT(S)
FERTILIZERS	SULFUR DIOXIDE
FUNGICIDE MAKERS	BENZENE
FURNACE LINERS	SILICA
FURNACE OPERATORS	SULFUR DIOXIDE
FURNACE FILTER MAKERS	ASBESTOS
FURNACE STARTERS	CARBON MONOXIDE
FURNACE WORKERS	CARBON MONOXIDE
FURNITURE MANUFACTURE	NOISE
FURNITURE FINISHERS	BENZENE
FUSED QUARTZ WORKERS	SILICA
GALVANIZERS	ARSENIC LEAD SULFUR DIOXIDE
GARAGE MECHANICS	CARBON MONOXIDE LEAD
GAS BOTTLE MAKERS	BERYLLIUM
GAS SHRINKING OPERATORS	NITROGEN DIOXIDE
GAS STATION ATTENDANTS	CARBON MONOXIDE
GAS WORKERS (ILLUMINATING)	BENZENE CARBON MONOXIDE
GASSET MILLERS	ASBESTOS

OCCUPATION	AGENTS
GASOLINE ENGINE TESTERS	CARBON MONOXIDE
GELATIN BLEACHERS	SULFUR DIOXIDE
GIN STAND OPERATORS (COTTON MILL)	COTTON DUST
GINNERS (COTTON MILL)	COTTON DUST
GLASS MAKERS	ANTIMONY ARSENIC BERYLLIUM LEAD SILICA SULFUR DIOXIDE
GLASS POLISHERS	LEAD
GLASS MANUFACTURE	NOISE
GLAZE MIXERS (POTTERY)	SILICA
GLAZE DIPPER (POTTERY)	ANTIMONY
GLOST-KILN WORKERS	LEAD
GLUE BLEACHERS	SULFUR DIOXIDE
GLUE MAKERS	BENZENE
GOLD REFINERS	ANTIMONY LEAD
GOLD EXTRACTORS	ARSENIC
GOLD REFINERS	ARSENIC
GRAIN BLEACHERS	SULFUR DIOXIDE
GRANITE CUTTERS	

OCCUPATION	AGENT(S)
GRANITE WORKERS	SILICA
GRINDERS (COTTON MILL)	SILICA
GRINDING WHEEL MAKERS	COTTON DUST
GRINDSTONE WORKERS	SILICA
GUN BARREL BROWERS	SILICA
GYROSCOPE MAKERS	LEAD
HAIR REMOVER MAKERS	BERYLLIUM
HAIRDRESSERS	ARSENIC
HANDPICKERS (COTTON)	BENZENE
HARD ROCK MINERS	COTTON DUST
HEAT TREATERS	SILICA
HEAT TREATERS (MAGNESIUM)	NITROGEN DIOXIDE
HEAT RESISTANT CLOTHING MAKERS	SULFUR DIOXIDE
HEAT TREATERS	ASBESTOS
HERBICIDE MAKERS	CARBON MONOXIDE
HIDE PRESERVERS	ARSENIC
HISTOLOGY TECHNICIANS	BENZENE
HYDROFLUORIC ACID WORKERS	ARSENIC

OCCUPATION	AGENT(S)
ICE MAKERS	ARSENIC
ILLUMINATING GAS WORKERS	SULFUR DIOXIDE
INCANDESCENT LAMP MAKERS	ARSENIC
INERT FILTER MEDIA WORKERS	LEAD
INK MAKERS	ASBESTOS
	ARSENIC
	BENZENE
	CHROMIC ACID
	LEAD
INSECTICIDE MAKERS	ANTIMONY
	ARSENIC
	BENZENE
	LEAD
	SILICA
	SULFUR DIOXIDE
INSECTICIDE USERS	LEAD
INSULATORS	SILICA
INSULATION WORKERS	ASBESTOS
	TOL. DIISOCYANATE
INSULATORS (WIRE)	ANTIMONY
INTERNAL GUIDANCE SYSTEM MAKERS	BERYLLIUM
IRON WORKERS	CARBON MONOXIDE
IRONING BOARD COVER MAKERS	ASBESTOS
ISOCYANATE RESIN WORKERS	TOL. DIISOCYANATE
JAPAN MAKERS	LEAD

OCCUPATION	AGENT(S)
JAPANNERS	LEAD
JAPAN PAINTERS	ARSENIC
JAPANNERS	ARSENIC
JET FUEL HANDLERS	NITROGEN DIOXIDE
JEWELERS	ARSENIC LEAD SILICA
JUNK METAL REFINERS	LEAD
JUTE WORKERS	SILICA
KILN LINERS	SILICA
LIQUOR RECOVERY FURNACE WORKERS	CARBON MONOXIDE
LABELERS (PAINT CAN)	LEAD
LABORATORY HOOD INSTALLERS	ASBESTOS
LACQUER PAINTERS	BENZENE LEAD NITROGEN DIOXIDE
LACQUER WORKERS	TOL. DIISOCYANATE
LAGGERS	ASBESTOS
LATE COLOR PAINTERS	ANTIMONY
LAUNDRY WORKERS	CARBON MONOXIDE
LEAD BURNERS	LEAD

DESCRIPTION	AGENT(S)
LEAD COUNTERWEIGHT MAKERS	LEAD
LEAD FLOORING MAKERS	LEAD
LEAD FOIL MAKERS	LEAD
LEAD HILL WORKERS	LEAD
LEAD MINERS	LEAD
LEAD PIPE MAKERS	LEAD
LEAD SALT MAKERS	LEAD
LEAD SHIELD MAKERS	LEAD
LEAD SHELTERS	LEAD
LEAD STEARATE MAKERS	LEAD
LEAD WORKERS	LEAD
LEAD SMELTERS	SULFUR DIOXIDE
LEAD BURNERS	ANTIMONY
LEAD HARDENERS	ANTIMONY
LEAD SHOT WORKERS	ANTIMONY
LEAD BURNERS	ARSENIC
LEAD SHOT MAKERS	ARSENIC
LEAD SHELTERS	ARSENIC

OCCUPATION	AGENT(S)
LEATHER DYEING	ANTIMONY
LEATHER WORKERS	ARSENIC
LEATHER MAKERS	BENZENE
LIFT TRUCK OPERATORS (PROPANE AND GASOLINE FUELED)	CARBON MONOXIDE
LIME BURNERS	ARSENIC
LIME KILN WORKERS	CARBON MONOXIDE
LINOLEUM MAKERS	BENZENE LEAD
LINOTYPERS	ANTIMONY LEAD
LINSEED OIL BOILERS	LEAD
LINT CLEANER OPERATORS (COTTON MILL)	COTTON DUST
LITHOGRAPHERS	LEAD
LITHOTRANSFER WORKERS	LEAD
LITHOGRAPHERS	BENZENE SILICA
LUMBERING	NOISE
MAGNESIUM FOUNDRY WORKERS	SULFUR DIOXIDE
MALEIC ACID MAKERS	BENZENE
MASONRY	SILICA
MATCH MAKERS	

OCCUPATION	AGENT(S)
	ANTHONY LEAD
MEAT PRESERVERS	SULFUR DIOXIDE
MEDICAL TECHNICIANS	NITROGEN DIOXIDE
MERCURY SMELTERS	CARBON MONOXIDE SULFUR DIOXIDE
METAL BURNERS	LEAD
METAL CUTTERS	LEAD
METAL GRINDERS	LEAD
METAL MINERS	LEAD
METAL POLISHERS	LEAD
METAL REFINERS	LEAD
METALLIZERS	LEAD
METAL FORMING	NOISE
METAL MACHINING	NOISE
METAL WORKING	NOISE
METAL BUFFERS	SILICA
METAL BURNISHERS	SILICA
METAL POLISHERS	SILICA
METAL REFINERS	ARSENIC SULFUR DIOXIDE

OCCUPATION -----	AGENT(S) -----
METAL BRONZERS	ANTIMONY
METAL CLEANERS	ARSENIC
METALLURGISTS	BERYLLIUM
METAL OXIDE REDUCERS	CARBON MONOXIDE
METAL REFINERS	CARBON MONOXIDE
METHANOL MAKERS	CARBON MONOXIDE
MICROSCOPICAL PREPARATION WORKERS	CHROMIC ACID
MILLINERY WORKERS	BENZENE
MINE WORKERS	NITROGEN DIOXIDE
MINE TUNNEL COATERS	TOL. DIISOCYANATE
MINERS	ANTIMONY ARSENIC CARBON MONOXIDE SILICA
MINING - OPEN PIT	NOISE
MINING - UNDERGROUND	NOISE
MIRROR SILVERERS	BENZENE LEAD
MISSILE TECHNICIANS	BERYLLIUM
MOLD MAKERS (PLASTIC)	BERYLLIUM
MOND PROCESS WORKERS	CARBON MONOXIDE

OCCUPATION -----	AGENT(S) -----
HOMOTYPERS	ANTHRONY CARBON MONOXIDE
HORDANTERS	ANTHRONY ARSENIC BENZENE
MORTAR MAKERS	SILICA
MOTORMAN	SILICA
MUSICAL INSTRUMENT MAKERS	LEAD
NEON SIGN WORKERS	BERYLLIUM
NEON TUBE MAKERS	BERYLLIUM
NICKEL REFINERS	CARBON MONOXIDE
NICKEL SMELTERS	CARBON MONOXIDE
NITRATE WORKERS	NITROGEN DIOXIDE
NITRIC ACID WORKERS	LEAD NITROGEN DIOXIDE
NITROGLYCERIN MAKERS	LEAD
NITROGEN DIOXIDE WORKERS	NITROGEN DIOXIDE
NITROCELLULOSE MAKERS	ARSENIC
NITROBENZENE MAKERS	BENZENE
NITROCELLULOSE WORKERS	BENZENE
NONSPARKING TOOL MAKERS	BERYLLIUM

OCCUPATION -----	AGENT(S) -----
NUCLEAR PHYSICISTS	BERYLLIUM
NUCLEAR REACTOR WORKERS	BERYLLIUM
NURSES	NITROGEN DIOXIDE
NYLON & MAKERS	TOL. DIISOCYANATE
OIL BLEACHERS	SULFUR DIOXIDE
OIL PURIFIERS	SILICA
OIL PROCESSORS	BENZENE SULFUR DIOXIDE
OIL PURIFIERS	CHROMIC ACID
OILCLOTH MAKERS	BENZENE
OILSTONE WORKERS	SILICA
OPENERS (COTTON MILL)	COTTON DUST
OPTICAL EQUIPMENT MAKERS	SILICA
ORDNANCE MANUFACTURING	NOISE
ORE SMELTING WORKERS	SULFUR DIOXIDE
ORE SMELTERS	ARSENIC
ORGANIC CHEMICAL SYNTHESIZERS	ANTIMONY ARSENIC BENZENE CARBON MONOXIDE CHROMIC ACID NITROGEN DIOXIDE TOL. DIISOCYANATE

OCCUPATION	AGENT(S)
ORGANIC SULFONATE MAKERS	SULFUR DIOXIDE
OXALIC ACID MAKERS	CARBON MONOXIDE
OXIDIZED CELLULOSE COMPOUND MAKERS	NITROGEN DIOXIDE
PAINTERS	LEAD
PAINT MAKERS	ANTIMONY LEAD
PAINT PIGMENT MAKERS	LEAD
PAINT MIXERS	SILICA
PAINTERS	ANTIMONY ARSENIC
PAINT MAKERS	ARSENIC ASBESTOS
PAINTERS	BENZENE
PAINT MAKERS	BENZENE
PAPER HANGERS	ARSENIC LEAD
PAPER MANUFACTURE	NOISE
PAPER PRODUCTS MANUFACTURE	NOISE
PAPER MAKERS	ARSENIC SULFUR DIOXIDE
PARAFFIN PROCESSORS	BENZENE
PIGMENT LEATHER MAKERS	

OCCUPATION -----	AGENT(S) -----
PEARL MAKERS (IMITATION)	CARBON MONOXIDE LEAD
PENCIL MAKERS	LEAD
PERFUME MAKERS	BENZENE
PETROLEUM REFINERY WORKERS	ANTIMONY BENZENE
PETROLEUM REFINING	BENZENE
PETROLEUM REFINERY WORKERS	NOISE
PETROCHEMICAL WORKERS	ARSENIC SULFUR DIOXIDE
PENTER WORKERS	BENZENE
PHARMACEUTICAL MAKERS	ANTIMONY
PHARMACEUTICAL WORKERS	LEAD
PHENOL MAKERS	ANTIMONY ARSENIC BENZENE
PHOSPHOR MAKERS	BENZENE
PHOSPHATE COATING STRIPPERS	ANTIMONY
PHOTOGRAPHY WORKERS	CHROMIC ACID
PHOTODENGRAVERS	LEAD
PHOTOGRAPHIC CHEMICAL MAKERS	NITROGEN DIOXIDE
	BENZENE

OCCUPATION -----	AGENT(S) -----
PHOTOGRAPHY WORKERS	CHROMIC ACID
PHYSICIANS	NITROGEN DIOXIDE
PICKERS (COTTON MILL)	COTTON DUST
PICPLERS	CHROMIC ACID NITROGEN DIOXIDE
PICRIC ACID MAKERS	BENZENE
PIGMENT MAKERS	ANTIMONY ARSENIC
PIPE FITTERS	LEAD NITROGEN DIOXIDE
PIPE INSULATORS	ASBESTOS
PLASMA TORCH OPERATORS	NITROGEN DIOXIDE
PLASTIC WORKERS	LEAD
PLASTICS MANUFACTURE	NOISE
PLASTIC PRODUCTS MANUFACTURE	NOISE
PLASTIC FOAM MAKERS	TOL. DIISOCYANATE
PLASTICIZER WORKERS	TOL. DIISOCYANATE
PLASTER CAST BRONZERS	ANTIMONY ARSENIC
PLASTIC WORKERS	ASBESTOS
PLASTICS MAKERS	
PLASTICS WORKERS	

OCCUPATION	AGENT(S)
	BERYLLIUM
PLUMBERS	ARSENIC LEAD
POLICEMEN	LEAD
POLICE	CARBON MONOXIDE
POLISHING SOAP MAKERS	SILICA
POLISH MAKERS	BENZENE
POLYURETHANE FOAM MAKERS	TOL. DIISOCYANATE
POLYURETHANE FOAM USERS	TOL. DIISOCYANATE
POLYURETHANE SPRAYERS	TOL. DIISOCYANATE
PORCELAIN WORKERS	ANTIMONY SILICA
POTTERY GLAZE MIXERS	LEAD
POTTERY GLAZE DIPPER	LEAD
POTTERY WORKERS	ANTIMONY LEAD SILICA SULFUR DIOXIDE
POTTERY DECORATORS	BENZENE
POTTERY KILN WORKERS	CARBON MONOXIDE
POUNCERS (FELT HAT)	SILICA
POWER PLANT OPERATORS	NOISE

OCCUPATION -----	AGENT(S) -----
PRECISION INSTRUMENT MAKERS	BERYLLIUM
PRESERVATIVE MAKERS	SULFUR DIOXIDE
PRESS BOX OPERATORS (COTTON MILL)	COTTON DUST
PRIMARY METAL PROCESSING	NOISE
PRINTERS	LEAD
PRINTING	NOISE
PRINTERS	ANTIMONY
PRINTING INK WORKERS	ARSENIC
PRINTERS	BENZENE
PRODUCER GAS WORKERS	CARBON MONOXIDE
PROTEIN MAKERS (INDUSTRIAL)	SULFUR DIOXIDE
PROTEIN MAKERS (FOOD)	SULFUR DIOXIDE
PULPSTONE WORKERS	SILICA
PUMP PACKING MAKERS	ASBESTOS
PUTTY MAKERS	BENZENE LEAD
PYRITES BURNERS	SULFUR DIOXIDE
PYROTECHNICS WORKERS	ANTIMONY ARSENIC
PYROXYLIN-PLASTICS WORKERS	LEAD

OCCUPATION -----	AGENT(S) -----
QUARRYING	NOISE
QUARRY WORKERS	SILICA
QUARTZ WORKERS	SILICA
RAW SILK BLEACHERS	NITROGEN DIOXIDE
RAYON MAKERS	ARSENIC
RECLAIMERS (RUBBER)	BENZENE
REFRACTORY MAKERS	CHROMIC ACID SILICA
REFRACTORY MATERIAL MAKERS	BERYLLIUM
REFRIGERATION WORKERS	SULFUR DIOXIDE
RESIN MAKERS	BENZENE
RIVETERS	LEAD
ROAD CONSTRUCTORS	SILICA
ROCK CRUSHERS	SILICA
ROCK CUTTERS	SILICA
ROCK DRILLERS	SILICA
ROCK GRINDERS	SILICA
ROCK SCREENERS	SILICA
ROCKET FUEL MAKERS	NITROGEN DIOXIDE

OCCUPATION -----	AGENT(S) -----
RODENTICIDE MAKERS	ARSENIC
ROOFERS	ASBESTOS LEAD
ROOFING MATERIALS MAKERS	ASBESTOS
ROTOGRAVURE PRINTERS	BENZENE
ROVING FRAME OPERATORS (COTTON MILL)	COTTON DUST
RUBBER BUFFERS	LEAD
RUBBER MAKERS	ANTIMONY BENZENE LEAD
RUBBER RECLAINERS	LEAD
RUBBER MANUFACTURE	NOISE
RUBBER PRODUCTS MANUFACTURE	NOISE
RUBBER COMPOUND MIXERS	SILICA
RUBBER COMPOUNDERS	ASBESTOS
RUBBER CEMENTERS	BENZENE
RUBBER GASKET MAKERS	BENZENE
SAND CUTTERS	SILICA
SAND PULVERIZERS	SILICA
SANDBLASTERS	SILICA

OCCUPATION -----	AGENT(S) -----
SANDPAPER MAKERS	SILICA
SANDSTONE GRINDERS	SILICA
SANITATION WORKERS	CARBON MONOXIDE
SAWYERS	SILICA
SCOURING SOAP WORKERS	SILICA
SCRAP METAL WORKERS	LEAD
SEALING WAX MAKERS	ARSENIC
SEMICONDUCTOR WORKERS	ANTIMONY LEAD
SEMICONDUCTOR COMPOUND MAKERS	ARSENIC
SERVICE STATION ATTENDANTS	LEAD
SEWER WORKERS	CARBON MONOXIDE
SHEEP DIP WORKERS	ARSENIC
SHEET METAL WORKERS	LEAD
SHELLAC MAKERS	BENZENE LEAD
SHINGLE MAKERS	ASBESTOS
SHIP DISMANTLERS	LEAD
SHIP BURNERS	TOL. DIISOCYANATE
SHIP WELDERS	TOL. DIISOCYANATE

OCCUPATION -----	AGENT(S) -----
SHIP BUILDERS	ASBESTOS
SHIP DEMOLITION WORKERS	ASBESTOS
SHIPBUILDING	NOISE
SHOE STAINERS	LEAD
SHOE FACTORY WORKERS	BENZENE
SHOE FINISHERS	BENZENE
SHOT MAKERS	LEAD
SILICA BRICK WORKERS	SILICA
SILICON ALLOY MAKERS	SILICA
SILK WEIGHTERS	LEAD
SILO FILLERS	NITROGEN DIOXIDE
SILVER POLISHERS	SILICA
SILVER REFINERS	ARSENIC
SILVER PLATERS	BERYLLIUM
SLASHING OPERATORS (COTTON MILL)	COTTON DUST
SLATE WORKERS	SILICA
SLUSHERS (PORCELAIN ENAMELING)	LEAD
SMELTERS	SILICA

OCCUPATION -----	AGENT(S) -----
SOAP MAKERS	BENZENE
SODA MAKERS	ARSENIC
SODIUM SILICATE MAKERS	SILICA
SODIUM SULFITE MAKERS	SULFUR DIOXIDE
SOIL STERILIZER MAKERS	ARSENIC
SOLDERERS	ARSENIC CARBON MONOXIDE LEAD
SOLDER MAKERS	ANTIMONY LEAD
SOLID ROCKET FUEL MAKERS	BERYLLIUM
SOLVENT MAKERS	BENZENE
SPACECRAFT WORKERS	SILICA
SPINDLE PICKERS (COTTON)	COTTON DUST
SPINNERS (COTTON MILL)	COTTON DUST
SPINNERS (ASBESTOS)	ASBESTOS
SPOOLING OPERATORS (COTTON MILL)	COTTON DUST
SPRAY PAINTERS	TOL DIISOCYANATE
STAINERS	BENZENE
STAIN MAKERS	BENZENE
STEEL ENGRAVERS	

OCCUPATION -----	AGENT(S) -----
	LEAD
STEEL MAKING	
	NOISE
STEEL MAKERS	
	CARBON MONOXIDE
STEREOTYPERS	
	ANTIMONY LEAD
STOKERS	
	CARBON MONOXIDE
STONE PRODUCTS INDUSTRIES (CEMENT MILLS)	
	NOISE
STONE WORKERS	
	NOISE
STONE BEDRUBBERS	
	SILICA
STONE CUTTERS	
	SILICA
STONE PLANERS	
	SILICA
STORAGE BATTERY CHARGERS	
	SULFUR DIOXIDE
STORAGE BATTERY WORKERS	
	ANTIMONY
STRAW BLEACHERS	
	SULFUR DIOXIDE
STREET SWEEPERS	
	SILICA
STRIPPER OPERATORS (COTTON)	
	COTTON DUST
STRIPPER OPERATORS (COTTON MILL)	
	COTTON DUST
STRIPPERS	
	CHRONIC ACID
STYRENE MAKERS	
	BENZENE
SUBMARINE WORKERS	

OCCUPATION	AGENT(S)
SUBWAY CONSTRUCTION WORKERS	ARSENIC
SUGAR REFINERS	SILICA
SULFITE MAKERS	SULFUR DIOXIDE
SULFURIC ACID MAKERS	SULFUR DIOXIDE
	NITROGEN DIOXIDE
	SULFUR DIOXIDE
SULFUR DIOXIDE WORKERS	SULFUR DIOXIDE
SULFURERS (MALT AND HOPS)	SULFUR DIOXIDE
SULFURIC ACID WORKERS	ARSENIC
SYNTHETIC FIBER MAKERS	BENZENE
TALC MINERS	ASBESTOS
TALC WORKERS	ASBESTOS
TANNERY WORKERS	LEAD
	SULFUR DIOXIDE
TANNERS	ARSENIC
	CHROMIC ACID
TAR WORKERS	ARSENIC
TAXIDERMISTS	ARSENIC
TBI WORKERS	TOL. DIISOCYANATE
TELEVISION PICTURE TUBE MAKERS	LEAD
TEMPERERS	LEAD

OCCUPATION -----	AGENT(S) -----
TEXTILE MAKERS	LEAD
TEXTILE MANUFACTURE	NOISE
TEXTILE BLEACHERS	SULFUR DIOXIDE
TEXTILE PROCESSORS	TOL. DIISOCYANATE
TEXTILE DRYERS	ANTIMONY
TEXTILE FLAMEPROOFERS	ANTIMONY ASBESTOS
TEXTILE PRINTERS	ANTIMONY ARSENIC
TEXTILE WORKERS	ASBESTOS
TEXTILE MORDANTS	CHROMIC ACID
THERMOMETER MAKERS (VAPOR PRESSURE)	SULFUR DIOXIDE
THIONYL CHLORIDE MAKERS	SULFUR DIOXIDE
TILE MAKERS	LEAD SILICA
TIN FOIL MAKERS	LEAD
TINNERS	ARSENIC LEAD
TOBACCO SEEDLING TREATERS	BENZENE
TOLL COLLECTORS (HIGHWAY)	CARBON MONOXIDE
TOOTH PASTE MAKERS	SILICA

OCCUPATION -----	AGENT(S) -----
TRAFFIC CONTROLLERS	CARBON MONOXIDE
TRANSPORTATION EQUIPMENT OPERATORS	NOISE
TREE SPRAYERS	ARSENIC
TRINITROTOLUOL MAKERS	BENZENE
TRUCKING	NOISE
TUBE MILL LINERS	SILICA
TUMBLING BARREL WORKERS	SILICA
TUNNEL WORKERS	CARBON MONOXIDE NITROGEN DIOXIDE
TUNNELING	NOISE
TUNNEL CONSTRUCTION WORKERS	SILICA
TUNNEL ATTENDANTS	CARBON MONOXIDE
TWISTERS (COTTON MILL)	COTTON DUST
TYPE FOUNDERS	LEAD
TYPE SETTERS	LEAD
TYPE METAL WORKERS	ANTIMONY ARSENIC
TYPE CLEANERS	BENZENE
TYPESETTERS	ANTIMONY
UNDERCOATERS	

OCCUPATION -----	AGENT(S) -----
UPHOLSTERY MAKERS	ASBESTOS
VANADIUM COMPOUND MAKERS	TOL. DIISOCYANATE
VARNISH MAKERS	LEAD
	ARSENIC
	BENZENE
	LEAD
VEGETABLE PRESERVERS	SULFUR DIOXIDE
VEHICLE TUNNEL ATTENDANTS	LEAD
VINYL-ASBESTOS TILE MAKERS	ASBESTOS
VINYL-ASBESTOS TILE INSTALLERS	ASBESTOS
VULCANIZERS	ANTIMONY
	BENZENE
	SULFUR DIOXIDE
WALLPAPER-PRINTERS	ARSENIC
	LEAD
WAR GAS MAKERS	BENZENE
WAREHOUSE WORKERS	CARBON MONOXIDE
WARFARE GAS MAKERS	ARSENIC
WATER WEED CONTROLLERS	ARSENIC
WATER GAS WORKERS	CARBON MONOXIDE
WAX MAKERS	BENZENE
WEAVERS (COTTON MILL)	COTTON DUST

OCCUPATION -----	AGENT(S) -----
WEAVERS (ASBESTOS)	ASBESTOS
WEED SPRAYERS	ARSENIC
WELDERS	BENZENE CARBON MONOXIDE LEAD NITROGEN DIOXIDE
WHETSTONE WORKERS	SILICA
WICKER WARE BLEACHERS	SULFUR DIOXIDE
WINDOW SHADE MAKERS	BENZENE
WINE MAKERS	SULFUR DIOXIDE
WIRE COATING WORKERS	TOL. DIISOCYANATE
WIRE DRAWERS	ARSENIC
WIRE INSULATORS	BENZENE
WOOD STAINERS	LEAD
WOOD PRODUCTS MANUFACTURE	NOISE
WOOD FILLER WORKERS	SILICA
WOOD BLEACHERS	SULFUR DIOXIDE
WOOD PULP BLEACHERS	SULFUR DIOXIDE
WOOD PRESERVATIVE MAKERS	ARSENIC
WOOD PRESERVERS	ARSENIC
WOOD DISTILLERS	

OCCUPATION

AGENT(S)

X-RAY TUBE MAKERS

CARBON MONOXIDE

ZINC MILL WORKERS

BERYLLIUM

ZINC SMELTER CHARGERS

LEAD

ZINC SMELTERS

LEAD

ZINC REFINERS

SULFUR DIOXIDE

ZINC CHLORIDE MAKERS

ANTIMONY

ZINC MINERS

ARSENIC

ZINC REFINERS

ARSENIC

ZINC WHITE MAKERS

ARSENIC

CARBON MONOXIDE

APPENDIX D.

REFERENCES FOR TOXICOLOGICAL DATA

ANTIMONY

Taylor¹ reported that workers exposed for a short duration to high concentrations of antimony trichloride (approximated at 73 milligrams per cubic meter of air) experienced acute antimony intoxication. Symptoms included respiratory tract irritation (partially associated with simultaneous exposure to hydrogen chloride), nausea and gastrointestinal symptoms including abdominal pain and loss of appetite.

Renes² investigated 69 cases of illness in workers engaged in antimony smelting exposed to atmospheric antimony dust and fume concentrations of 5-12 milligrams per cubic meter of air. Worker symptoms included upper respiratory symptoms including abdominal cramps, diarrhea and vomiting.

Brieger³ reported an investigation of 125 workers in the abrasives industry using antimony trisulfide. The workers were exposed to atmospheric concentrations of antimony ranging from 3-5.5 milligrams per cubic meter of air. Six workers died of heart failure. Thirty-seven (37) to seventy-five (75) workers examined showed abnormal EKG's (T wave change). Workers showed concentrations of antimony in urine of up to 9.6 milligrams per liter. The particle size of the contaminant in this investigation was less than 2 microns.

McCallum⁴ reported a study in an antimony processing plant where atmospheric concentrations ranged from 3 to greater than 5 milligrams of antimony per cubic meter of air. Radiographic lung changes in workers were reported. Antimony concentrations in urine ranged up to 0.68 milligrams per liter.

Bulmer and Johnson⁵ reported the study of workers exposed to atmospheric concentrations of antimony trisulfide dust of 42-52 milligrams per cubic meter of air (as antimony). They reported no evidence of damage in workers. The large particle size of the dust is offered as an explanation.

ARSENIC

Elkins⁶ reports that an average air concentration of 0.2 milligrams per cubic meter of arsenic inhaled by workers will result in an average level of 1 milligram of arsenic per liter in urine.

Perry⁷ in a study of 31 workers in a chemical factory making sodium arsenite sheep dip reported that these workers were exposed to atmospheric concentrations of arsenic ranging from 0.110-4.038 milligrams per cubic meter of air with a mean of 0.562 milligrams per cubic meter and a median of 0.379 milligrams per cubic meter. Of the 31 workers examined, 28 showed hyperpigmentation, 9 had warts; there was an average of 0.23 milligrams arsenic per liter of urine and 108 parts per million arsenic in hair.

Ott⁸ calculated total arsenic dosages received by workers in a chemical manufacturing plant and showed an apparent dose-response relationship for respiratory cancer deaths. Blejer and Wagner,⁹ using the data of Ott, calculated eight hour time-weighted average exposures that would give the same total dosages after a 40 year work life. The calculated eight hour time-weighted average exposures ranged from 1.0 to 740 micrograms of arsenic per cubic meter of air. The data indicated that as the exposure to arsenic concentrations increased, the ratio of observed deaths to expected deaths increased.

Lee and Fraumeni¹⁰ in a study of a large smelter population showed that in an area where the average worker exposure was to atmospheric concentrations of arsenic of 0.206 milligrams per cubic meter of air, respiratory cancer deaths were greater than the expected incidence.

Henderson¹¹ reports the following physiological responses to various concentrations of arsine: slight symptoms after exposure of several hours to 3-10 parts per million parts of air (ppm), maximum concentration that can be inhaled one hour without serious consequences is 6-30 ppm, dangerous after exposure of 30 to 60 minutes at 16-60 ppm, and fatal after 30 minutes at 250 ppm.

ASBESTOS

The available information indicates evidence of a dose-response relationship for asbestos exposure and the risk of asbestosis and/or bronchogenic carcinoma. However, much of this information is epidemiological in nature and there is little correlation between epidemiologic data and environmental exposure data. For this reason and others, including the long latent period for the development of carcinomas, it is difficult, if not impossible, to develop a specific dose-response relationship. This should be taken into consideration when referring to the following material.

Enterline¹² has reported an exposure-response relationship between asbestos exposure (evaluated as millions of particles per cubic foot years) and the risk of malignant and nonmalignant respiratory disease. Enterline's data indicates that the risk of respiratory cancer increased from 166.7 (standardized mortality ratio) at minimum exposure to 555.6 at cumulative exposures exceeding 750 million particles per cubic foot years. Enterline's data is summarized in a table by NIOSH¹³.

Murphy¹⁴ reported that asbestosis was 11 times more common among pipe coverers in new ship construction than in a control group. The first asbestosis was found after 13 years of exposure to an estimated cumulative dose of about 60 million particles per cubic foot years. After 20 years, asbestosis prevalence was 38%. Murphy reported no asbestosis for men exposed to 60 mppcf years but 20% asbestosis in men exposed to 75-100 mppcf years. Murphy reports atmospheric dust concentrations ranged from 0.8-10.0 mppcf depending on the different operations evaluated. Asbestosis was considered present if the worker had at least three of the following: vascular rales in two or more sites, clubbing of the fingers, vital capacity of less than 80% predicted, roentgenography consistent with moderately advanced or advanced asbestosis, shortness of breath on climbing one flight of stairs.

The Pennsylvania Department of Health¹⁵ reported a study of asbestos dust concentrations in two plants (one studied from 1930-1967 and the other from 1948-1968). 64 cases of asbestosis were reported. In the two plants, the study indicates that the air concentrations of particulates were generally less than five mppcf and in many cases less than two mppcf.

Epidemiological evidence is also available relating the development of mesothelioma with exposure to asbestos. Selikoff^{16,17} reported 14 deaths from mesothelioma in 532 asbestos insulation workers from 1943-1968. No deaths from mesothelioma would be expected from the same number of individuals in the general population.

BENZENE

Flury and Zernik¹⁸ indicated that for an acute exposure to benzene, 20,000 ppm can be lethal if inhaled 5-10 minutes, 7,500 ppm can be lethal if inhaled 30 minutes to one hour, and 3,000 ppm can be tolerated for 30 minutes to one hour.

Stewart¹⁹ reported a study of ten workers chronically exposed to benzene for several years at less than 25 ppm who were accidentally exposed to benzene concentrations of 85-115 ppm for three months. Six workers complained of fatigue and all showed signs of mild anemia. Nine of ten workers recovered in 4-8 months.

Greenburg²⁰ reported a study of 332 workers in three roto-gravure plants. Exposures in the three plants were to benzene concentrations of 50-1000 ppm, 24-675 ppm, and 11-298 ppm; 130 of the 332 workers were found to have varying degrees of benzene poisoning. In 48% of the workers, red blood cell count was less than 4.5 million, in 33% platelets were less than 100,000, and in 15% white cell count was less than 5,000. In 235 workers examined for hemoglobin (Hgb) the Hgb was less than 13 grams per 100 milliliters of blood. Normal blood values for red cells are 4.6-6.2 million, for white cells 5000-10,000, for platelets 150,000-350,000, and Hgb 14.0-18.0 grams.

Savilähti²¹ reported a study of 147 workers exposed to benzene in a shoe factory. The workers were exposed for more than 10 years. Six months before the medical study, air samples collected for benzene showed air concentrations of 318 ppm, 433 ppm and 470 ppm in three working areas. Blood abnormalities were found in 73% of the workers (62% thrombocytopenia, 32% leukopenia, 35% anemia and all three simultaneously in 31 workers). Within three months after removal from benzene exposure, 120 workers became asymptomatic. One worker died.

Juzwiak²² published results of a study of blood examinations on 585 workers in 13 shoe plants. There was limited environmental data available but from 1960-1963, air concentrations of benzene ranged from 31-156 ppm. After changing solvent blend in 1964, air concentrations of benzene ranged from 41-44 ppm. 73% of the workers were reported to have reduced red blood cell count, 8.5% had reduced white cell count, and 91% had reduced Hgb levels. Environmental data was too scanty to draw correlations of exposure and effect.

Vigliani and Saita²³ report of a worker in a roto-gravure plant exposed to benzene concentrations between 190-660 ppm. Four years after, the worker was hospitalized with blood abnormalities (depression of the formed elements). Post-mortem findings showed myeloid metaplasia of the liver and spleen.

Pagnotto²⁴ reported a study conducted in 11 rubber coating plants. 65 samples for benzene concentrations in air were collected with only 4 samples exceeding 40 ppm (the highest being 125 ppm). Urinary phenol determinations were made for 162 workers and compared with the atmospheric

exposure levels. The author indicated good urine-air correlation. The following table is derived from Pagnotto's study:

<u>URINARY PHENOL MILLIGRAMS PER LITER</u>	<u>APPROXIMATE AVERAGE EQUIVALENT BENZENE AIR LEVEL (ppm)</u>
100	10
120	13
140	16
160	19
180	22
200	25
220	27
240	29
260	31
280	33
300	35
320	38
340	41
360	44
380	47
400	50
420	53
440	56
460	59
480	62
500	65
520	68
540	71
560	74
580	77
600	80

Pagnotto also reported that blood studies on 47 workers in one plant showed 5 with low Hgb levels and 2 with low red blood cell count.

Hardy and Elkins²⁵ reported the results of blood studies on 52 workers in a plant using naphtha solvents. It was noted that for 8 years prior to the blood study the plant's operation had undergone no significant change (also no change in ventilation systems). Deviations in more than one blood element were found in 16 workers. 6 of these 16 workers were exposed to average benzene concentrations not exceeding 60 ppm and 2 others were probably exposed to benzene up to 80 ppm.

BERYLLIUM

There is difficulty in correlating workroom exposure to beryllium with beryllium disease cases because of a lack of quantitative data before 1947 (due to the fact that

beryllium had not been positively identified as the disease causing agent and the nonexistence of a reliable analytical method). With respect to these limitations, the following data is offered.

Sterner²⁶ reported workers have developed respiratory conditions after working in areas where beryllium concentrations in air regularly exceeded $100 \mu\text{g}/\text{M}^3$ and have respiratory conditions consistently produced when air concentrations of beryllium (insoluble compounds) exceeds 1 milligram per cubic meter of air.

The National Institute for Occupational Safety and Health²⁷ (NIOSH) reports the development of chronic beryllium disease in a worker exposed for one year to atmospheric concentrations of beryllium generated from fabrication work (machining and polishing) on beryllium-copper. The worker was exposed to atmospheric concentrations of beryllium of $19.7 \mu\text{g}/\text{M}^3$ (general room air), $208-346 \mu\text{g}/\text{M}^3$ (polishing) and $0.08-1.6 \mu\text{g}/\text{M}^3$ (machining).

NIOSH also reports the development of chronic beryllium disease in a worker in a ceramic machine shop (technician and maintenance work) exposed to beryllium in air for $9\frac{1}{2}$ years. Air sampling data supplied by the employer showed the worker was exposed to beryllium concentrations (based on a daily time-weighted average) of a low of $0.7 \mu\text{g}/\text{M}^3$, a high of $5.9 \mu\text{g}/\text{M}^3$, and an average of $2.0 \mu\text{g}/\text{M}^3$. From information supplied by the worker involved here, it could be expected that the worker's exposure to beryllium was greater than that indicated by the employer's figures.

Eisenbud²⁸ reported that environmental studies conducted in areas where acute beryllium poisoning occurred indicated that workers inhaled a total quantity of beryllium (as beryllium fluoride) of $45 \mu\text{g}$ during twenty minutes of exposure.

CARBON MONOXIDE

Many of the reports dealing with carbon monoxide (CO) toxicity are in terms of carboxyhemoglobin (COHb) percentage in blood. The percent of COHb depends on many factors including CO concentrations in air, total time of exposure to various air concentrations of CO, diffusion rate of CO through the lungs, ventilation rate, type of activity being done, metabolic rate, barometric pressure and temperature. NIOSH²⁹ recommends an allowable level for CO of 35 ppm based on an 8 hour time-weighted average exposure so that COHb percent does not exceed five. The current allowable limit of 50 ppm CO based on an eight hour time-weighted average exposure is designed to maintain COHb less than 10%.

SYMPTOMS CAUSED BY VARIOUS AMOUNTS OF
CARBON MONOXIDE HEMOGLOBIN IN THE BLOOD³⁰

<u>BLOOD SATURATION</u> <u>% COHb</u>	<u>SYMPTOMS</u>
0-10	No symptoms.
10-20	Tightness across forehead, possible slight headache, dilation of cutaneous blood vessels.
20-40	Headache and throbbing in temples. Severe headache, weakness, dizziness, dimness of vision, nausea, vomiting, collapse.
40-50	Same as previous item with more possibility of collapse and syncope. Increased respiration and pulse.
50-60	Syncope, increased respiration and pulse, coma with intermittent convulsions and Cheyne - Stokes respiration.
60-70	Coma with intermittent convulsions, depressed heart action and respiration and possible death.
70-80	Weak pulse and slow respiration, respiratory failure and death.

TIME FOR VARIOUS CONCENTRATIONS OF CARBON MONOXIDE TO PRODUCE
80% EQUILIBRIUM VALUE OF BLOOD SATURATION

CO IN AIR ppm	BLOOD SATURATION % (80% of Approx. Equil. Values)	TIME (Hours)
200-300	23-30	5-6
400-600	36-44	4-5
700-1000	47-53	3-4
1100-1500	55-60	1½-3
1600-2000	61-64	1-1½
2100-3000	64-68	½-3/4
3100-5000	68-73	20-30 Min.
5000-10000	73-76	2-15 Min.

There have been a number of reports showing evidence of behavioral effects in man on exposure to low levels of CO. The results of these studies indicate that exposure to low concentrations of CO could affect a worker's ability to work safely. McFarland³¹ reported difficulties in visual discrimination at 5% COHb (similar results were reported by Halperin³²). Horvath³³ reported significantly impaired vigilance at 6.6% COHb. Schulte³⁴ indicated various physiological and behavioral tests were effected by COHb levels as low as 5%. Beard^{35,36} in two reports showed exposure to CO in concentrations ranging from 50-250 ppm caused a deterioration in the ability to discriminate auditory stimuli and exposures to 50 ppm caused impairment in time discrimination. Trouton³⁷ reported impairment in muscle limb coordination at COHb levels of approximately 5%. There have been a number of studies made relating carbon monoxide exposures to cardiovascular ramifications. NIOSH³⁸ concludes that the results of these studies provide sufficient evidence so that "based on cardiovascular alterations which could prove to be of severe physiological consequences for persons with CHD (coronary heart disease), a significant portion of who are in the worker population, it seems advisable that levels of COHb (carboxyhemoglobin) in excess of 5% should be avoided."

CHROMIC ACID

Bloomfield and Blum³⁹ report a study in six plating plants. 23 workers were examined including 5 controls with no known exposures to chromic acid. Estimated exposures for the other workers ranged from 0.12-5.6 mg/M³ (with 6 platers exposed at 0.12 mg/M³). Workers exposure to chromic acid ranged from one week to six months. All exposed workers were observed to have inflamed mucosa, and three had nose-bleeds.

Kleinfeld and Rosso⁴⁰ report a study of chromium plating workers exposed from two weeks to twelve months to atmospheric concentrations of chromic acid ranging from 0.18-1.4 mg/M³. All of the workers studied had either perforated or ulcerated septum or injection of the septum.

Vigliani and Zurlo⁴¹ reported of a three year study of approximately 150 workers exposed to average concentrations of 0.11-0.15 mg/M³ (exposures were to chromic acid mist and anhydride and to alkali chromates). Symptoms reported in workers included ulceration of the nasal septum, inflammation of the laryngeal mucosa and conjunctiva, and chronic asthmatic bronchitis. One case of cancer of the nasal septum and one case of lung cancer were reported. (There is no data linking chromic acid alone as a carcinogen in the literature.) Gomes⁴² reports a study of 303 platers examined clinically of which the exposures of 81 were determined as representative. 43.2% of the workers were exposed to atmospheric concentrations of chromic acid less than 0.1 mg/M³, but only 37.6% of the workers examined were free of nasal ulceration and perforation (24% had perforations, and 38.4% ulcerations).

Zvaifler⁴³ and Gresh⁴⁴ report a study of chromic acid exposures in an anodizing plant. Nasal irritation and ulceration were reported in workers exposed to 0.42-1.2 mg/M³ chromic acid. Improved ventilation reduced air concentrations to 0.09-0.10 mg/M³ but nasal irritation persisted 4 weeks later (none worsened). Further ventilation improvements reduced exposures to chromic acid to negligible levels and nasal irritation cleared up in four weeks.

COKE OVEN EMISSIONS

Information is insufficient to determine which specific compounds in the coke oven emissions are the causative agent or agents of lung cancer, although some polynuclear aromatic hydrocarbons, including benzo(a)pyrene, have been identified in animal experiments as being carcinogenic. Also, factors such as the latency of carcinogenic effect (a long disease development period, possibly up to 30 years before the tumor is detected), individual susceptibility, and the theory that a threshold exposure level below which exposure does not cause cancer might not exist for susceptible individuals, make the establishment of a dose-response relationship impractical, if not impossible with current knowledge. What evidence that exists today linking coke oven emissions to an increased incidence of cancer development in workers exposed to coke oven emissions is the result of epidemiological studies.

Doll⁴⁵ reported an 81% excess in lung cancer deaths in gas retort pensioners in comparison with the general population.

Lloyd and Redmond⁴⁶ reported that men employed five years or more on top of coke ovens have a 10 times greater lung cancer mortality rate than other steelworkers. They indicated that men with a mixture of top and side oven exposure had a 3.2 times greater mortality rate from lung cancer. Also, men with five or more years of only side exposure had a mortality rate from lung cancer 2.1 times greater.

Christian⁴⁷ reported a 24-fold excess in lung cancer for coke oven workers at a large utility.

There have been various reports of the possibility of skin cancer from exposure to the CTPV fraction. Henry⁴⁸ reported 84 cases of epitheliomatous ulceration or cancer of the skin (including 40 scrotal cancers) among British coke oven workers between 1900 and 1943. By contrast, OSHA⁴⁹ reports that in a recent survey of 15 skin cancer deaths among steelworkers in the United States, none had been workers employed at the coke ovens. OSHA continues "because of the relatively low incidence rate of this disease and the high survival rate for skin cancer, it is impossible to determine whether the lower rate of skin cancer deaths among American coke oven workers is a reflection of differential response, differences in medical care, or other factors such as sampling variations."

There have not been any reports indicating an excess of bladder cancer deaths in coke plant workers in the United States. Redmond⁵⁰ has reported a seven times greater mortality rate from kidney cancer for coke oven workers (although this is based on a small number of cases, it is important since kidney cancer is usually rare in the general population).

COTTON DUST

There have been a number of studies attempting to correlate between dust concentrations and the prevalence of byssinosis and a general correlation is evident (especially when considering only the size selective fraction of the dust). Generally speaking, at low concentrations, the relationship between byssinosis prevalence and dust concentrations is approximately linear. An attempt will be made to provide available toxicological data in table form.

The British Occupational Hygiene Society Committee on Hygiene Standards⁵¹ compiled figures on the prevalence of byssinosis at different levels of total dust and the number of workers with byssinosis and the concentrations of total dust to which they were apparently exposed. This information is presented in the following two tables.

PREVALENCE OF BYSSINOSIS
COMPARED TO KNOWN DUST EXPOSURES

<u>TOTAL DUST</u> <u>EXPOSURE mg/M³</u>	<u>PREVALENCE</u> <u>(BYSSINOSIS</u> <u>ALL GRADES)</u>	<u>NUMBER OF</u> <u>PEOPLE</u> <u>EXAMINED</u>
0-0.5	1.5%	212
0.5-1.0	2.8%	108
1.0-2.0	9.9%	1259
2.0-3.0	8.5%	1226
3.0-4.0	34.0%	465
4.0-5.0	55.0%	245
5.0-(34.0)	27.5%	92

NUMBER OF BYSSINOTIC WORKERS WITH GRADE II SYMPTOMS
AT VARIOUS LEVELS OF DUST CONCENTRATION

<u>TOTAL DUST</u> <u>mg/M³</u>	<u>NUMBER OF WORKERS WITH BYSSINOSIS</u>		<u>REFERENCE</u>
	<u>ALL GRADES</u>	<u>GRADE II</u>	
1.5	9	0	Roach
1.6	8	1	Mekky
1.7	40	10	Roach,
			Zuskin
2.8	29	2	Mekky
3.5	22	5	Mekky
4.0	142	29	Roach
6.0	5	0	Mekky

Merchant⁵² et al reported a good correlation in American mills between the prevalence of byssinosis and the concentration of lint-free dust (using the vertical elutriator cotton dust sampler). Merchant's results are reported in the following two tables taken from NIOSH.

PREDICTED DUST LEVELS
TO PRODUCE VARIOUS PREVALENCES OF BYSSINOSIS

BYSSINOSIS PREVALENCE %	MILLIGRAMS PER CUBIC METER OF LESS THAN 15 μ m DUST			
	ALL GRADES		GRADES 1 & 2	
	LEVEL	95% LIMITS	LEVEL	95% LIMITS
1	0.021	0.012 0.033	0.060	0.034 0.082
2	0.036	0.021 0.051	0.097	0.063 0.14
3	0.050	0.032 0.068	0.13	0.130 0.20
4	0.063	0.043 0.084	0.16	0.12 0.25
5	0.07	0.054 0.10	0.20	0.21 0.31
10	0.15	0.12 0.18	0.38	0.25 0.64
25	0.48	0.40 0.59	1.10	0.84 2.1
50	1.70	1.2 2.7	3.63	1.6 8.0
			7.4	28.5

PREDICTED PREVALENCE OF BYSSINOSIS
 BY LESS THAN 15 μ m DUST LEVEL COTTON PREPARATION
 AND YARN AREA WORKERS NORTH CAROLINA 1970-71

LESS THAN 115 μ m DUST LEVEL mg/m ³	PERCENT BYSSINOSIS				
	ALL GRADES		GRADES 1 & 2		GRADE 2
	%	95% LIMITS	%	95% LIMITS	
0.1	6.5	5.0	2.1	1.3	0.7
		8.5		3.3	2.3
0.2	12.7	10.8	5.0	3.8	2.1
		14.9		6.6	4.3
		22.5		10.7	6.1
0.5	25.8	29.3	13.1	15.8	10.2

Fox⁵³ reported correlation between time-weighted average exposures to fly-free dust and prevalence of byssinosis as detailed in the following table from NIOSH.

PREVALENCE OF BYSSINOSIS
IN TIME-WEIGHTED DUST EXPOSURE GROUPS

<u>TIME-WEIGHTED DUST GROUP (mg years/M³)</u>	<u>NUMBER OF SUBJECTS EXAMINED</u>	<u>MEAN TIME- WEIGHTED DUST MEASUREMENTS (mg years/M³)</u>	<u>% PREVALENCE BYSSINOSIS GRADE 1/2 AND OVER</u>
0.0-10.0	330	5.75	3.63
10.1-20.0	257	15.34	9.73
20.1-30.0	206	24.06	12.31
> 30.0	347	48.50	22.19

NIOSH⁵⁴ compiled the reported cases of byssinosis, all grades, which have been correlated with measured dust exposures. This data is compiled in the following table.

BYSSINOSIS CASES AND DUST CONCENTRATIONS

<u>INVESTIGATOR</u>	<u>YEAR</u>	<u>NUMBER OF CASES</u>	<u>DUST CONCENTRATION - mg/M³</u>	
			<u>TOTAL (t) OR RESPIRABLE (r)</u>	<u>FLY-FREE OR LESS THAN 15 µm</u>
A. Exposed to over 0.25 mg/M ³ fly-free dust.				
Roach	1960	155	1.5-5+ (t)	0.3-1.5+
Wood	1964	52		0.7-1.2
Lammers	1964	106	0.2 (r)	0.4
Belin	1965	67		1.65-4.54
Mekky	1967	63		0.35-1.92
Molyneux	1968	365	0.9-5.4 (t)	0.28-1.65
Zuskin	1969	27		0.43-1.07
El Samra	1972	1	1.0 (t)	0.3
Valic	1972	6	1.07 (r)	2.1
Valic	1972	29	0.55 (r)	1.1
Merchant	1973	197		0.35-1.7
Tuma	1973	211		0.25+
Fox	1973	157		0.55-3.74
Berry	1974	289		0.25-2.38
Imbus	1974	158		0.2-2.0

BYSSINOSIS CASES AND DUST CONCENTRATIONS (Continued)

B. Exposed to less than 0.25 mg/M³ fly-free dust.

Roach	1960	6	1.0- (t)	0.3-
Lammers	1964	11	0.03-0.1 (r)	0.06-0.2
Merchant	1973	58		0.05-0.23
Imbus	1974	23		0.2-

LEAD

Lane⁵⁵ reported a study of nine lead workers in a storage battery industry who had been exposed to lead concentrations in air around 0.5 milligrams per cubic meter of air for over 20 years. All died from hypertension and renal failure between the ages of 42 and 52.

Williams, King and Walford⁵⁶ report the following data taken in table form from the National Institute for Occupational Safety and Health:

AIR LEAD CONC. IN MILLIGRAMS PER CUBIC METER	BLOOD LEAD MILLIGRAMS PER 100 MILLILITERS	URINE LEAD MILLIGRAMS PER LITER	URINE COPRO- PORPHYRIN (DONATH)	URINE ALA* MILLIGRAMS PER 100 MILLILITERS
0.20	0.070 (0.048-0.092)	0.143 (0.056-0.230)	4.2 (2.4-6.0)	1.8 (0.3-3.3)
0.15	0.060 (0.038-0.082)	0.118 (0.031-0.205)	3.6 (1.8-5.4)	1.4 (0.1-2.9)

*ALA values were determined by a method which probably gives higher values than do other methods, thus a high "normal" value.

The figures in the top lines indicate mean values.

(It is recommended⁵⁷ that blood lead levels greater than 0.080 milligrams lead per 100 grams whole blood is indicative of unacceptable lead absorption and that urine lead levels of 0.20 milligrams lead per liter of urine or greater is indicative of unacceptable lead absorption.)

Elkins⁶ assembled data available on lead in air and lead in urine and reported that a urinary lead level of 0.2 milligrams lead per liter of urine would, averaging, correspond to an air concentration of 0.2 milligrams lead per cubic meter of air.

Hartogenesis and Zielhuis⁵⁸ report blood changes in workers exposed to lead chromate dust in concentrations greater than 0.2 milligrams per cubic meter of air as lead. They

further report doubtful changes in blood at exposures to atmospheric concentrations between 0.1 and 0.2 milligrams per cubic meter as lead.

The following data relating average blood lead content with exposure and duration of employment has been adapted from Dreesen et al⁵⁹ Committee on Biologic Effects of Atmospheric Pollutants⁶⁰, and the National Institute of Occupational Safety and Health⁵⁷.

DURATION OF LEAD EXPOSURE	AIR LEAD CONTENT MILLIGRAMS PER CUBIC METER			
	0-0.074	0.075-0.14	0.15-0.29	0.3 OR MORE

YEARS 0-4

Number	17	16	32	20
Average	0.0187	0.0316	0.0378	0.0463
Mean	0.021	0.030	0.038	0.050

YEARS 5-9

Number	10	13	40	24
Average	0.0278	0.0405	0.0501	0.0505
Mean	0.033	0.040	0.043	0.050

YEARS 10-14

Number	23	24	30	32
Average	0.0193	0.0375	0.0502	0.0481
Mean	0.018	0.038	0.046	0.048

YEARS 15+

Number	44	30	59	45
Average	0.0293	0.0407	0.0457	0.0493
Mean	0.023	0.036	0.045	0.045

NITROGEN DIOXIDE

Cooper and Tabershaw⁶¹ summarized reports of the effects of nitrogen dioxide on man. They indicated that the odor of nitrogen dioxide can be perceived at 1-3 ppm; that a report by Vigdortschik⁶² showed that workers exposed for 3-5 years at 2.6 ppm nitrogen dioxide displayed multiple symptoms and signs and blood changes (however, no methods, criteria or data was given in Vigdortschik's report so it is difficult to develop a dose-response relationship); that a report by Meyers⁶³ indicated that of eight human volunteers exposed to 13 ppm nitrogen dioxide, 3 showed eye irritation, 7 had nasal irritation, 4 had pulmonary discomfort, 6 had olfactory cognition, and 2 had central

nervous system effects; Meyers also reported that of volunteers exposed for five minutes to 25 ppm nitrogen dioxide, 5/7 had slight or moderate nasal discomfort, 3/7 had pulmonary discomfort, and 6/7 detected odor (no consistent findings of changes in inspiratory reserve, expiratory reserve, vital capacity or MBC were observed); Meyers also reported that of seven volunteers exposed for one minute to air concentrations of 50 ppm nitrogen dioxide, 3 had pulmonary discomfort and nasal irritation; Grayson⁶⁴ described exposure to 50-100 ppm nitrogen dioxide as causing bronchiolitis fibrosa obliterans and focal pneumonitis with recovery in 6-8 weeks; Adley⁶⁵ reported exposure of volunteers to 80 ppm nitrogen dioxide resulted in tightness of the chest in 3 to 5 minutes; Lehmann⁶⁶ reported exposure of volunteers to 100 ppm nitrogen dioxide resulted in marked irritation of the larynx and cough; Grayson⁶⁴ reported that exposure to 300-400 ppm nitrogen dioxide will cause bronchopneumonia and death in a few minutes and a few minutes exposure to 500 ppm nitrogen dioxide will cause pulmonary edema.

Norwood⁶⁷ reports a case of pulmonary edema in a worker performing oxyacetylene cutting. It was estimated that the worker was exposed to 90 ppm nitrogen dioxide (plus metal fume).

Patty⁶⁸ indicates that the odor threshold for nitrogen dioxide is around 5 ppm. He reports concentrations of 10-20 ppm are mildly irritant to the eyes, nose and mucous membranes of the upper respiratory tract. He adds that there is little difference in intensity of odor and irritation between 20-100 ppm. Patty's data seems to conform well with that summarized by Cooper and Tabershaw⁶¹.

Patty⁶⁸ also reports of his study of workers working 6 to 8 hours a day for 18 months in a nitric acid recovery plant to air concentrations of nitrogen dioxide ranging from 5-30 ppm (averaged 10-20 ppm). Patty reports no significant ill health nor characteristic adverse effects were detected in these workers during periodic physical examinations.

NOISE DOSE-RESPONSE DATA

The following reports of dose-response relationships are taken from NIOSH.⁶⁹ NIOSH summarized audiometric surveys carried out between 1960-1970 in the United States and other countries. The following sections in quotes are all from NIOSH.

Coles and Knight⁷⁰ reported a study of workers in diesel-engine testing. "Maximum noise level 116 dB. Of six men who worked continuously in the intense noise of the two-stroke test-house (average period 3½ years) all had losses of 45-60 dB in one or both ears at 3.4 and 6 KHz, and none could be accounted for by an aging factor."

Yaffe and Jones⁷¹ reported a study of Federal penitentiary workers (textiles, wood products, sheet metal, brush, shoe and clothing manufacture and printing) where octave band noise levels ranged from 75-110 dB. "Those levels which exceeded octave band criteria produced significant hearing threshold shifts at 3, 4, and 6 KHz after 24 months exposure. The locations producing the largest shifts were cotton mill twist and weaving departments, woolen mill weaving departments and furniture mills."

Schneider⁷² reported a study of 294 jobs in chemical works involving 691 individuals. "Data divided into 4 noise exposure groups based on octave band criteria indicated that the group exceeding criteria more than 10% of the time experienced a permanent threshold shift of 1 dB per year at 2, 3, and 4 KHz. For the group near criteria exposure most of the hearing loss occurred within the first 5 or so years."

Brohm and Zlamal⁷³ reported a study of noise in the cabs of heavy trucks ranging from 90-110 dB. "Examinations made on 51 truck drivers and in each case a loss of hearing was determined."

Mancini and Stancari⁷⁴ reported a study of 50 fettlers. "Men working in 9 foundries with noise levels of 92-110 dB. In men who had been working for more than 5-6 years in noisy conditions almost all frequencies were involved; those who had worked less than 2-3 months in noisy conditions showed a loss varying from 30 to 50 dB at 400 Hz."

Chadwick⁷⁵ reported a study of 12 men exposed to noise from industrial gas-turbine engine noise. "Noise levels reached as high as 113 dB flat...the low-tone loss in just over two years was in the region of 10 dB and from 2000-4000 Hz was in the order of 20 dB...the average loss for the speech frequencies was...eight times more than that to be expected in a more conventional industry with a known noise hazard."

Filin⁷⁶ reported a study of drivers of self-propelled jumbos in underground ore mining. "Noise levels of 127 dB at frequencies between 1000 Hz and 8000 Hz. Hearing loss in 91 of 135 miners examined; after 10 years' work, 26 dB loss at 4000 Hz."

Weston⁷⁷ reported a study of agricultural tractor drivers. "53 drivers of tractors of different horsepower; audiograms showed greater impairment in inland drivers where the tractors are of higher power and exposure is for longer periods than on coast-plain farms. Noise levels ranged

from 92 dB to 106 dB, occasionally as high as 114 dB."

Cohen⁷⁸ reported a study where "hearing levels for heavy earth-moving equipment operators, paper bag workers, and airport ramp workers were compared with those of non-noise exposed groups. Noise encountered ranged from 80-120 dB (A-weighted sound level). The hearing levels of the heavy earth equipment operators were found to be significantly higher than the non-noise exposed groups. The paper bag workers had higher hearing levels but not as high as the earth equipment operators. The airport ramp personnel, however, had the lowest hearing levels, probably due to the intermittency of their exposures."

Burns⁷⁹ reported a study of 759 employees in 32 various industrial factories with noise levels ranging from 78 to 109 dBA. "A relationship between noise level, exposure duration and hearing level was defined with two parameters: audiometric frequency and percentage of persons expected to exceed a specific hearing level. A-weighted sound level was found to be adequate for estimating hearing level for the industrial noises measured."

Stone⁸⁰ reported a study of "3116 employees of 9 steam electric generating plants and 2 hydroelectric plants were tested. Noise levels from assorted equipment ranged from 91 to 127 dBA, the more intense values associated with coal hoppers, turbine generators and pumps, and forced draft fans. Prevalence of hearing impairment (defined by hearing levels averaging more than 15 dB (re ASA 1951) at test frequencies of 0.5, 1 and 2 KHz) varied from 4.7 percent for the younger workers having less than two years of service to 31.9 percent for the oldest workers with 26 years or more experience. Boilermakers, heavy equipment operators and conveyor car operators as classes had high incidences of hearing impairment."

SILICA

It is difficult for various reasons including lack of environmental data, difficulty in converting data obtained in terms of mppcf to mg/M^3 , and a long period of exposure before silicosis is manifested, to establish a relationship between lifetime dust exposure and disease incidence. However, epidemiological evidence does indicate that the higher the dust concentration of free silica, the higher the prevalence of silicosis and the more rapid the development of silicosis.

Renes⁸¹ reported a study of workers in 18 ferrous foundries. Of foundrymen examined, 178 showed pulmonary fibrosis (9.2% incidence). Among workers with 20 or more years exposure, the incidence of pulmonary fibrosis was 25.8%.

The amount of free silica in the dust varied from 13-29% depending on operations. Renes indicated that 82% of the air samples were below 6.9 mppcf, although dust levels at certain operations such as mechanical shakeout were considerably higher (10-75 mppcf).

Flinn⁸² reported a study of 9 potteries between 1936 and 1937. 2516 workers engaged in pottery making were studied, and 139 (7.8%) were determined to be silicotic, 123 (4.5%) were classed as first stage silicotic, 60 (2.4%) were classed as second stage; 6 (0.24%) were classed as third stage. 78 cases of silicosis were found in workers with dust exposures of 6-7 mppcf; 7 cases at exposures between 5-6 mppcf; 9 cases at exposures between 4-5 mppcf; and 2 cases below exposures to 4 mppcf. Estimated free silica content of settled dust samples ranged from 1-39%. Particle size diameter indicated 1.2 microns. Flinn's data is summarized in the following table from NIOSH.⁸³

RELATION OF DUST CONCENTRATION AND
LENGTH OF EMPLOYMENT IN THE POTTERY INDUSTRY
TO SILICOSIS (1st, 2nd 3rd STAGES)

DUST CONCENTRATION mppcf	YEARS IN POTTERY INDUSTRY				OVER 40
	0-9	10-19	20-29	30-39	
0-3.9					
Silicosis Cases	-	1	1	-	-
Workers Exposed	481	223	65	21	8
Percentage	0	0.4	1.5	0	0
4-7.9					
Silicosis Cases	1	6	26	27	29
Workers Exposed	321	198	110	53	34
Percentage	0.3	3	24	51	85
8-15.9					
Silicosis Cases	-	8	5	10	10
Workers Exposed	176	119	25	17	14
Percentage	0	7	20	59	71
OVER 16					
Silicosis Cases	13	33	10	5	4
Workers Exposed	363	174	21	7	5
Percentage	4	19	48	71	80

Hosey⁸⁴ reported in 1957 no cases of silicosis in granite workers whose exposure to dust subsequent to 1937 averaged less than 5 mppcf. The airborne dust averaged 25% free silica. Hosey's results were the same as those of Russell who also reported an upper level of exposure for granite workers without silicosis of 5 mppcf.

Fulton⁸⁵ reported a study of 1035 workers in a silica brick industry. 538 (52%) were classed as either first, second or third stage silicotic. A prevalence rate of 41-58% was found in workers grouped in either of three exposure classes (0-9.9 mppcf, 10-19.9 mppcf, 20 or above mppcf). Men working with chiefly quartz showed an average of 17.9 years exposure required to develop stage 2 silicosis. Men working with dusts containing primarily tridymite and cristobalite were found to have third stage silicosis after an exposure of 17.9 years. 14 of 65 workers with an average exposure of 2-4 mppcf were found to be silicotic. No silicosis was found in workers with an average exposure of less than 2 mppcf.

Vigliani⁸⁶ reported a study of 20 workers in manufacturing of filter candles containing 80% calcined diatomaceous earth. The x-ray diffraction pattern indicated the crystalline structure of cristobalite present. 13 workers showed various stages of silicosis. Dust exposures were estimated at 11-14 mppcf. Particle size ranged from 0.5-2 microns.

SULFUR DIOXIDE

When referring to the toxicological data presented here, consideration should be given to the facts that generally, data concerning air concentrations of sulfur dioxide is minimal, and direct exposure correlation with observed effects is difficult because of mixed exposures (that is, exposures to sulfur dioxide and other agents).

Acute exposures to air concentrations above 20 ppm sulfur dioxide have an irritant, choking and sneezing effect. Acute exposures to concentrations of sulfur dioxide of around 50 ppm can promptly cause irritation of the nose and throat, rhinorrhea and cough. According to Greenwald⁸⁷ these symptoms are so disagreeable as not to be tolerated by most people for more than 15 minutes.

Kchoe⁸⁸ reported a study of 100 men exposed to relatively pure sulfur dioxide gas used as a refrigerant. The men had a mean duration of exposure of 3.8 years to atmospheric concentrations of sulfur dioxide ranging from 5-70 ppm and averaging 20-30 ppm. Workers exposed to sulfur dioxide showed respiratory disfunctions including symptoms of upper respiratory tract irritation, coughing, epistaxis, constriction of the chest and hemoptysis. Exposed workers, as opposed to controls, showed a significantly high incidence of nasopharyngitis, alteration in the senses of taste and smell, increased sensitivity to other irritants, a tendency of increased fatigue and shortness of breath on exertion and a longer duration of common colds.

Skalpe⁸⁹ reported of a study of 54 workers in paper-pulp mills exposed to concentrations of sulfur dioxide ranging from 2-36 ppm with some short duration exposures up to 100 ppm (respirators were used during performance of these operations). The mean durations of employment were 6.8 years for those under 50 years of age, and 20.3 years for those over 50. The exposed workers, as opposed to controls, has a higher frequency of cough, expectoration, and shortness of breath upon exertion. It was also found that in those workers under 50, the average expiratory flow rate was lower in exposed workers than in controls.

There have been a number of experimental studies exposing volunteers to low concentrations of sulfur dioxide. The results of these studies are summarized as follows: Frank⁹⁰ reported an average 39% increase in pulmonary flow resistance within 10 minutes exposure to 5 ppm sulfur dioxide in 11 men. Nadel⁹¹ reported that the inhalation of 4-6 ppm sulphur dioxide for 10 minutes resulted in increased airway resistance in 7 men. Snell and Luchsinger⁹² reported a decrease in maximum expiratory flow from the level of $\frac{1}{2}$ vital capacity in 9 men exposed to 5 ppm sulfur dioxide. Melville⁹³ reported changes in specific airway conductance of 49 people exposed to 5 ppm sulfur dioxide.

The following regarding sulfur dioxide as a carcinogen is taken from NIOSH.⁹⁴ "The role of sulfur dioxide in human carcinogenesis is largely one of association rather than direct incrimination. The human mortality study of Lee and Fraumeni in 1969 reported the positive correlation between sulfur dioxide exposure and observed deaths from respiratory cancer. Mortality ranged from 2½ to 6 times expected in groups selected as having light, medium, and heavy exposures to sulfur dioxide along with arsenic (no environmental data were given). The study indicated that persons with heavy exposure to arsenic and moderate or heavy exposure to sulfur dioxide were most likely to die of respiratory cancer. It should be emphasized, however, that arsenic has been implicated as an occupational carcinogen without sulfur dioxide being present. In addition, there are no studies known which implicate sulfur dioxide by itself as a carcinogen in either man or animals."

TOLUENE DIISOCYANATE

When considering exposure to TDI, both the primary irritant effects and sensitization must be considered. There is sufficient information to conclude that the primary irritant effects of TDI are dose-related. However, once people are sensitized to TDI, there appears to be little or no dose-response relationship.⁹⁵ This should be kept in mind when considering the following data.

There is a report of a study of 12 workers in an automobile plant making polyurethane foam crashpads.⁹⁵ For the first 3 weeks the workers were exposed to air concentrations of TDI not exceeding 0.01 ppm. The next week, air concentrations of TDI rose to 0.03-0.07 ppm. At the latter exposure, all workers complained of respiratory symptoms including coryzal symptoms, continuous coughing, sore throat, dyspnea, fatigue and night sweats. Subsequently, air concentration of TDI were reduced to 0.01-0.03 ppm. For the next 3½ months there were no further respiratory symptoms or complaints, and none of the workers appeared to have any permanent effects or became sensitized from the exposure.

Walworth and Virchow⁹⁶ report a study of workers' health for 2½ years in a polyurethane foam plant producing slabs. The average values of air concentrations of TDI were given as a range of 0.00-2.6 ppm with a time-weighted average level estimated in the range of 0.00-0.15 ppm (monthly). 83 workers developed illnesses attributed to TDI. 54 showed upper respiratory infection, 11 had tracheitis, 9 had bronchitis, and 9 had bronchial asthma. Most illnesses, it was reported, started between the third and fourth week of exposure. The report indicates evidence of sensitization.

Elkins⁹⁷ published a report on a 5-year study of TDI exposure in 15 plants. The author concluded that 0.01 ppm for TDI was "a not unreasonable limit." Elkin's data is summarized in the following table:

SUMMARY OF TDI CONCENTRATIONS IN AIR AND
CASES OF TDI INTOXICATION AT 14 PLANTS

PLANT	YEAR	AIR ANALYSIS		WORKERS EXPOSED	NUMBER OF CASES	
		NUMBER OF TESTS	AVERAGE TDI CONCENTRA- TION (PPM)		ACCEPTED, ESTABLISHED	QUESTION- ABLE OR DISPUTED
1	1957	-	-	2	1	1
2	1957-8	14	0.005	50	3	28
2	1960	33	0.028	100	14	25
2	1961-2	55	0.015	50	3	2
3	1958-60	12	0.009	25	-	-
4	1958-62	21	0.004	40	5	15
5	1958-61	11	0.003	6	1	?
6	1958-61	28	0.015	40	8	-
7	1961	4	0.001 (Less	4	-	-
8	1961	5	0.001*than)	5	1	-
9	1961	3	0.006	4	-	-
10	1961	14	0.002**	3	2	-
11	1961	14	0.54**	4	4	-
12	1962	6	0.009	6	-	1
13	1962	4	Nil	20	-	1
14	1962	6	0.000	20	-	-
TOTAL		230		379	42	73

* Probably not representative of exposure.

** Not representative of exposure.

Glass and Thom⁹⁸ report a study in 3 plants in New Zealand. In one plant where polyurethane foam was produced in a batch molding process, atmospheric TDI concentrations ranged from 0.003-0.0123 ppm and 3 cases of respiratory sensitization were reported in one year. In the second plant (similar to the first), TDI concentrations in air ranged from 0.005-0.100 ppm and two mild cases of coryzal symptoms, one case of possible sensitization and one case of acute asthma attack on heavy exposure (with no evidence of sensitization) were reported. In the third plant, polyurethane foam was produced in the continuous slab process. Air concentrations of TDI ranged from 0.000-0.018 ppm in the third plant. Two cases of mild coryzal symptoms with no evidence of sensitization were reported (the men experiencing these symptoms wore canister-type respiratory protection).

Williamson⁹⁹ reported a study of 18 workers exposed to air concentrations of TDI generally below 0.02 ppm except for a brief exposure (not more than 10 minutes) to at least 0.2 ppm after a spill. Over a 14 month period, no differences in ventilatory measurements were detected within a work-shift from Monday to Friday. It was reported that none of the men suffered illness attributed to TDI or developed TDI sensitization during this study.

Marion¹⁰⁰ reported a study of 7 workers exposed to TDI in a plastic varnish plant. Environmental data was minimal because only 3 measurements of TDI in air were made (0.08 ppm, 0.10 ppm and 0.12 ppm). Symptoms developed within $\frac{1}{2}$ hour to 3 weeks following initial exposure. All workers had cough and dyspnea and 4 had hemoptysis. There was evidence that 4 workers had become sensitized to TDI.

Bruckner et al¹⁰¹ reported a study of 26 workers exposed to a range of 0.0-2.4 ppm isocyanates and a range of median values of 0.0-0.033 ppm over an 11 year period. The workers were engaged in research and development and production of isocyanates, presumably including TDI. 5 workers showed minimal symptoms of mucous membrane irritation, 16 showed marked irritation of the respiratory tract, and 5 were sensitized. 4 of the 5 sensitized workers showed a positive lymphocyte transformation test (an indication of an immunologic allergic sensitization) using TDI-human serum albumin conjugate as the antigen.

Peters¹⁰² reported a long-term study of ventilatory measurements on workers repeatedly exposed to TDI. Initial atmospheric concentrations of TDI ranged from 0.0001-0.0030 ppm and later concentrations ranged from 0.0000-0.0120 ppm. After exposure to TDI on the first

day of this study, decreases were reported in the forced vital capacity (FVC), FEV 1.0, peak flow rate (PFR) and flow rate at 50% and 25% of vital capacity of all 38 workers studied. At the end of the first week, FVC had returned to baseline but mean FEV 1.0 was still depressed and mean flow rates were even more depressed. A follow-up was made six months later on 28 of the workers still available. As a group, the 28 showed decrease in mean FEV 1.0, FEV 1.0/FVC and in flow rates. 3 workers had cough and phlegm. Continued decline in FEV 1.0 was reported in the workers studies at six month intervals for a total of two years.

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CARBON MONOXIDE

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APPENDIX E.

GLOSSARY OF TERMS

ACGIH. American Conference of Governmental Industrial Hygienists.

Acoustic, Acoustical. Containing, producing, or rising from, actuated by, related to, or associated with sound.

Acoustic Trauma. Hearing loss caused by sudden loud noise or by sudden blow.

Acuity. Pertaining to the sensitivity of hearing or vision.

Acute. Severe, usually crucial, often dangerous; in which relatively rapid changes are occurring. An acute exposure runs a comparatively short course.

Adhesion. A holding together by new tissue, produced by inflammation or injury.

Adsorption. The condensation of gases, liquids, or dissolved substances on the surfaces of solids.

Air Monitoring. The continuous sampling for and measuring of pollutants in the atmosphere.

Allergy. An abnormal response of a hypersensitive person to chemical and physical stimuli.

Anemia. Deficiency in the hemoglobin and/or red blood cells.

Angina. Spasmodic, choking or suffocative pain.

Asphyxia. Suffocation from lack of oxygen.

Asthenia. Lack or loss of strength; debility.

Audiogram. A test and recording of hearing ability.

Audiometer. An instrument for measuring hearing ability.

Benign. Harmless.

Biologic Monitoring. Periodic examination of blood, urine or any other body substance to determine exposure to toxic materials.

Biopsy. Removal of small bits of living tissue from the body for study.

Blood Count. A count of the number of different blood cells circulating in the body.

Blood Dyscrasia. An abnormality of the blood or blood forming system.

Body Burden. The amount of a harmful material in the body at a given time.

Bone Conduction Test. A hearing test conducted by placing a vibrating tuning fork on the bony portion of the head.

Bone Marrow. The soft tissue of bone which is part of the blood forming system.

Bronchial Tubes. Branches or subdivisions of the trachea (windpipe).

Bronchiogenic. Pertaining to the bronchi.

Bronchiole. One of the finer subdivisions of the bronchial tree. The area where oxygen and carbon dioxide are exchanged between air and blood.

Bronchitis. Inflammation of the bronchial tubes.

Bronchoscopy. Examination of the bronchi through a bronchoscope, an instrument used for visual examination of the interior of a bronchus.

Bronchospasm. Spasm of the bronchi or bronchioles.

Cancer. A malignant tumor characterized by proliferation of abnormal cells (carcinoma or sarcoma).

Carcinogen. Substance which is capable of causing cancer.

Ceiling Limit. The maximum level which should not be exceeded for any period of time. OSHA has some exceptions to this rule.

Chemical Cartridge. The type of absorption unit used with a respirator for removal of low concentrations of solvent vapors and certain gases.

Chromatography. An analytical technique for the separation and identification of chemical compounds.

Chronic. Persistent, prolonged, repeated.

Chronic Obstructive Lung Disease. Interference with normal breathing.

Coalescence. Fusion of two or more parts.

Colorimetry. An analytical technique based on measuring color.

Coma. Prolonged unconsciousness.

Compound. A chemical substance composed of two or more elements joined according to the laws of chemical combination. Each compound has its own characteristic properties different from those of its constituent elements.

Conductive Hearing Loss. Type of hearing loss not caused by noise exposure, but due to any disorder in the middle ear or external ear that prevents the sound from reaching the inner ear.

Conjunctivitis. Inflammation of the mucous membrane that lines the eyelids and the front of the eyeball.

Consolidation. The act of becoming solid. Used in connection with the solidification of the lungs due to engorgement of the lung tissues, as occurs in acute pneumonia.

Contaminant. A material that is foreign to the normal atmosphere.

Cor Pulmonale. Hypertrophy or failure of the right side of the heart.

Cornea. The transparent part of the eye.

CPS. Cycles per second (Hertz); a measurement of frequency of sound.

Cyanosis. Slightly bluish, greyish, slate-like, or dark purple discoloration of the skin due to presence of abnormal amounts of reduced hemoglobin in the blood.

Cytology. Pertaining to the formation, structure, and function of cells.

dB(A). Sound level in decibels read on the A-scale of a sound level meter.

Decibel (dB). A unit used to measure sound intensity.

Dermatitis. Inflammation of the skin from any cause.

Differential Blood Count. Determination of the number of (different) white blood cells in a cubic millimeter of blood.

Differential Diagnosis. Comparison of symptoms of two or more similar diseases, to determine which disease the patient has.

Digital Clubbing. Rounding and swelling of the ends of the fingers.

Direct-Reading Instrument. An instrument which gives an immediate indication of concentration of an airborne contaminant by some means such as a meter or the changing color of a chemical.

Edema. A swelling of body tissues.

Emphysema. A lung disease, in which the walls of the air sacs (alveoli) have been stretched and broken down.

Epithelioma. Carcinoma of the epithelial cells of the skin.

Erythema. Reddening of the skin.

Erythrocyte. The mature red blood corpuscle.

Etiology. The study of the causes of disease.

FEV₁. Forced expiratory volume in one second; a test of pulmonary function.

Fibrosis. A thickening, associated with growth of fibrous tissue.

FVC. Forced vital capacity; a test of lung function.

Hematocrit. The volume of red blood cells.

Hematologic Toxins. Poisonous substances affecting the blood or blood-forming tissues.

Hematology. The study of blood and the blood-forming organs.

Hematuria. Blood in the urine.

Hemoglobin. The red coloring matter of the blood which carries the oxygen.

Hemolysis. Breakdown of red blood cells with liberation of hemoglobin.

Hemoptysis. Spitting blood or blood-stained sputum.

. Profuse bleeding.

jury. Damage to the liver.

Infection of the liver.

it of frequency of sound.

Congestion from an unusual amount of blood.

ntation. Increased coloration of the skin.

ic. Excessive proliferation of cells.

c. Reduced or defective production of cells.

on. The reaction of body tissue to injury.

Hygiene. The science that deals with the
n, evaluation and control of potential health
the industrial environment.

Term used to designate compounds that
do not contain carbon.

al. Pertaining to the small spaces between

n. Secretion and discharge of tears.

. Inflammation of the larynx.

oice box.

iod. The time which elapses between exposure
rst manifestation of symptoms.

n injury, damage, or abnormal change in a
organ.

A blood disease distinguished by over-
of white blood cells.

A white blood cell.

is. An increase in the number of
d cells.

. A reduction in the number of white
s.

. A neoplasm or tumor that is cancerous.

Malignant. Virulent, harmful.

Mean Corpuscular Volume. A measurement of red blood cells expressed as the average volume.

Medical Monitoring. Periodic evaluation of body functions to ascertain state of health.

Mesothelioma. A malignant tumor of the membrane which surrounds the internal organs of the body.

Mists. Liquid droplets suspended in air.

Myalgia. Tenderness or pain in the muscles.

Narcotic. Producing stupor or sleep.

Nephritis. Inflammation in the kidneys.

NIOSH. National Institute for Occupational Safety and Health.

Node. A small round or oval mass of tissue.

Nodule. A small node.

Nuisance Dust. An innocuous dust.

Opacities. Opaque areas or spots.

OSHA. Occupational Safety and Health Administration or Occupational Safety and Health Act.

Otologist. A physician who has specialized in surgery and diseases of the ear.

Ototoxic. Drugs which can affect hearing acuity.

Palpitation. Rapid heart beat of which a person is acutely aware.

Particulate Matter. A suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays.

Pathological. Abnormal or diseased.

Pleurisy. Inflammation of the lining of the lungs or chest cavity.

Pneumonitis. Inflammation of the lungs.

ppm. Parts of vapor or gas per million parts of air (by volume).

Preexisting Disease. A disease known to exist before the onset of current symptoms.

Presbycusis. Hearing loss due to age.

Prognosis. Prediction of future course of a disease.

Purpura. Hemorrhage into the skin or mucous membrane.

Pyelography. X-ray examination of the renal pelvis and ureter.

Radiomimetic Substance. A substance which imitates the biological effects of ionizing radiation.

Rafter Sample. A sample of dust taken from a rafter or other settling place. Representative of but not identical to dust suspended in air.

Remission. Lessening severity or abatement of symptoms.

Serum. The clear fluid that separates from the blood when the blood clots.

Skin Absorption. Penetration of the unbroken skin by a material.

Subcutaneous. Beneath or to be introduced beneath the skin.

Substernal. Beneath the breastbone.

Syncope. Fainting.

Synergism. Cooperative action of substances, producing a total effect greater than the sum of their separate effects.

Systemic. Spread through the body.

Time-Weighted Average (Exposure). An average of several samples taken at various times during a working day. Usually more representative of the true exposure to a person for evaluation of long term effects from a harmful agent.

Tinnitus. A ringing sound in the ears.

Threshold Limit Value (TLV). An atmospheric exposure level under which most people can work without harmful effects.

Toxicology. Study of the effects of toxic or poisonous substances.

Trachea. The windpipe.

Tracheobronchitis. Inflammation of the mucous membrane that lines the trachea or bronchi.

Trauma. An injury or a wound.

Tumor. A swelling or growth of useless cells.

VC (Vital Capacity). A test of lung function.

Vertigo. Dizziness.

LEGAL ASPECTS
OF
OCCUPATIONAL DISEASE COVERAGE

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Workers' Compensation Task Force
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Occupational Diseases and
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When one hears the term "legal aspects" in relation to workers' compensation, the picture which most often comes to mind is associated with the trial of litigated cases. The image may be one of positive assistance, or of unnecessary meddling, depending upon one's point of view, but the essential theme will generally be that of litigation. This is an unfortunate condition.

The proper concept of the "legal aspects" of worker's compensation programs, and the role of the legal profession in such programs, is in reality that of one segment of the administration of workers' compensation laws. In this context, "administration" means far more than just the activities undertaken by the state workers' compensation agency. To the contrary, it includes, in degrees which vary from jurisdiction to jurisdiction, claimants, private attorneys, employers, insurance carriers, physicians, and, in occupational disease cases, numerous other individuals and groups involved in the development of exposure criteria, the testing of work places, and related activities.

Thus, when we speak of the "legal aspects" of a program, attention must be drawn away from the rather narrow view which concerns itself primarily with litigation, and focus instead on the overall administration of the law, again using a broader meaning of the word "administration" than

the limited concept of agency activity. When used in this sense, the terms "legal aspects" and "administration" of occupational disease claims are almost indistinguishable, and will be so treated in this paper.

The administration of claims for compensation benefits based upon occupational disease begins with the definition of occupational disease contained within the applicable workers' compensation law. It is the definition that determines the questions which must be resolved by the administrative agency, the claimant, the employer, and the insurance carrier in either arriving at a voluntary acceptance of the claim, or entering into the various procedures which must be followed in order to resolve a contested claim. Unless the statutory definition of "occupational disease" provides all participants in the system with meaningful guidelines and reflects a clear understanding of the scope of coverage intended, the goal of efficient and equitable administration of occupational disease claims will most likely remain unattainable.

Over the years, many changes have occurred in statutory provisions for occupational disease coverage. The early use of limited schedules to delineate what diseases will be deemed "occupational" has gradually been replaced by what are known as "full coverage" statutes. This trend has progressed to the point that the National Commission on State Workmen's Compensation Laws, in its Report, was able to state that "Most states have therefore amended their

statutes to provide full coverage of occupational diseases...."¹ However, a close comparison of the extent of coverage implied by other statements in the Report with actual practices under "full coverage" statutes indicates that there is still a considerable degree of disparity among the meanings given to "full coverage" by various individuals and groups.

The National Commission, in recommendation R2.13, stated that "We recommend that all states provide full coverage for work-related diseases."² As previously noted, the Report indicates that most states have, in fact, provided such coverage, and that considerable progress has been made in meeting this particular recommendation. However, in its very next recommendation, R2.14, the National Commission stated that "We recommend that the 'arising out of and in the course of employment' test be used to determine coverage of injuries and diseases."³ (emphasis added), and went on to define "work-related" as "having a causal relationship to the conditions of employment; in workmen's compensation, the usual legal test for 'work-related' is 'arising out of and in the course of employment.'"⁴ It is here that the disparity is found.

In the area of accidental injury, the development of the "arising out of and in the course of" concept has resulted in relatively broad coverage. In the formative years of workers' compensation, compensability of accidental injuries was often limited to instances in which the injury-producing risk was one peculiar to the particular employment involved, or was increased by the employment as compared to the exposure of the general public. However, this test, known as the "positional risk"

or "increased risk" test has over the years been replaced by far less restrictive interpretations, so that at the present time, in almost every state one would expect that a worker who tripped over his own feet while walking from his desk to the water cooler, and as a result suffered bodily injury, would receive compensation. Similarly, an office worker who caught her hand in the door of her car while preparing to leave the company parking lot at the end of the day would most likely be entitled to benefits.

However, even under "full coverage" occupational disease statutes, this degree of coverage, far removed from the "peculiar risk" or "increased risk" doctrine, has not yet been universally recognized. Most "full coverage" statutes contain provisions which present at least the potential of denying benefits for diseases which are in reality "work-related". For example, many statutes contain a provision similar to that found in the Alabama law, which requires that the disease be "...due to hazards in excess of those ordinarily incident to employment in general and is peculiar to the occupation in which the employee is engaged...".⁵ A significant number of other studies have limitations similar to that in effect in Arizona, which requires that "The disease does not come from a hazard to which workmen would have been equally exposed outside of the employment."⁶

While court interpretations of such provisions may limit their impact, there remains the very real possibility of claims being denied, not as the result of a lack of employment connection, but because ^{of} an absence of "peculinity". Cases such as

Morrison v. Allied Chemical Corp.⁷, in which benefits were denied for work-related benzolpoisoning, and Brooks v. State Department of Transportation⁸, in which miliaria rubra (heat rash) was held not to be an occupational disease, attest to the existence of opportunities to deny claims for what are in reality work-related diseases.

In fact, if the tests used to determine the compensability of accidental injuries were used to determine the compensability of diseases, it is extremely likely that benefits would be awarded in numerous cases which are presently considered far removed from the realm of "occupational disease", even under liberal definitions of the term. Through the use of these tests, compensability could be found upon a showing that the disease was contracted during the course of employment, through contact with some agency of the employment. This would be true regardless of whether the disease was highly unusual and caused by a chemical used extensively in the particular employment, or was merely a common cold, contracted through exposure to a fellow employee. As is well known, this is presently not the case, and as a result, talk of "full coverage" of occupational diseases, and the appropriate statutory definitions for such coverage, must take into consideration the somewhat loose interpretations that have been given to "full coverage".

In reality, when there is discussion of "full coverage" of occupational diseases, the reference is usually to occupational disease coverage that is not limited to specific named diseases, and does not anticipate a simple application of the "arising out

of and in the course of" tests to diseases in general.⁹ The reasons for these attitudes are perhaps two-fold. First, the term "occupational disease" has for the most part always implied a disease peculiar to a particular occupation or run of occupations. Major areas of concern have been limited to diseases which have occupied so much of the time and effort expended in resolving occupational disease problems. Even today, concern is directed mainly towards diseases which have been determined to be closely related to a particular employment or exposure, rather than to efforts to require coverage of all diseases, (regardless of whether they are "glamour issues") as long as they arise out of and in the course of the employment.

Without passing on the merits of this "argument", it should be pointed out that it is more than faintly reminiscent of the arguments used in the early years of workers' compensation to attempt to limit coverage of accidental injuries, arguments which have, over the past 60 years, been rejected.

The second reason for what might be called "limited full coverage" is the burdens that "actual full coverage" might place upon the compensation system. It is beyond the resources of this writer to estimate the impact of "actual full coverage" of diseases upon the financial and physical resources of the compensation system, as well as the impact of various restrictions which could be placed upon such coverage. However, given the prevalence of numerous diseases which might be contracted during employment, including influenza, colds, and other communicable diseases, as well as the rather impressive array of what might be termed "environmental diseases" resulting from a combination of

occupational and non-occupational exposures which seem to be discovered on an almost daily basis, these unknowns must play a significant role in considerations of the intended scope of occupational disease coverage.

It is impossible, within the confines of this paper and conference, to resolve the question of an "ideal" definition for occupational disease coverage. Such a definition must be determined in part through the resolution and adjustment of differing philosophical approaches to the role of workers' compensation in dealing with diseases, and, as a practical matter, must take into consideration the impact of particular definitions on the system. However, the point remains that one cannot blindly assert that that the day of full coverage of occupational disease has arrived and that with the exception of those few states that retain schedule coverage only,¹⁰ statutory provisions are necessarily adequate.

Also, there are all sorts of statutory enactments which further limit the achievement of true "full coverage" of occupational diseases. Almost half of the state laws contain requirements that disease claims be filed within a fixed number of years subsequent to the last exposure to the causative agent, other than subsequent to the manifestation or knowledge of the disease. As a result, diseases which develop slowly, or are not diagnosed within the claims period, can remain uncompensated, despite full compliance with the statutory definition of occupational disease. Regate v. Bituminous Fire & Marine Ins. Co.,¹¹ in which the employee's asbestosis did not manifest itself until after the running of the claim period, is an example of a denial of benefits under such circumstances.

Similarly, many statutes contain exposure criteria, particularly in the field of dust diseases, which require a specified period of exposure shifts, (measured in days, years, shifts or other units) before a disease can be the subject of an award of benefits. Although an argument can be made for the use of such criteria as guidelines in awarding benefits, their existence as absolute barriers, irregardless of the certainty of work-connecting of the disease in a particular case, must be questioned. Furthermore, the great disparity in the exposures required in different states for the same disease seriously undermines the validity of such tests as indicatives of the occupational nature of a disease in specific cases.

Even after all these barriers have been overcome, and a disease held to be "occupational" and compensable, a substantial minority of states limit the benefits available to those with occupational diseases, or specific diseases, as compared to compensation recipients in general. Medical benefits may be restricted, and indemnity benefits for permanent partial disability may be reduced, or even eliminated entirely.

Surely we cannot talk of "full coverage" of occupational diseases when there exist provisions such as these, which guide effectively limit both the scope of coverage, and the availability of full benefits to many workers suffering from what are known to be work-related diseases. These areas of concern must be dealt with, and modified or eliminated, before "full coverage" can be considered a reality.

Once the intended scope of coverage is determined, and

appropriate statutory provisions enacted, there remains at least one more hurdle which must be overcome before the traditional aspects of administration, those concerned with the processing of individual cases, can be reached. That is, the problem of bringing into the compensation system those employees who are suffering from what are known to be, or what may be, occupational diseases. This task is one which normally is not considered a major activity of workers' compensation administrative agencies and in fact, it is probably unrealistic to assume that an agency would be permitted to actively seek out cases which might involve compensable disease conditions.

However, there is nothing unusual about administrative agencies assisting in the educational processes which will ultimately result in appropriate cases being brought into the system. Such assistance can and should be given to other interest groups, so that doctors and employee representatives can be made aware of possible connections between employment exposure and disease in order that they in turn may alert workers to the possibilities of valid compensation claims. This is a formidable task which cannot be ignored. Few employees have the knowledge to equate a disease condition which develops over an extended period of time with exposure to hazards at work which may not even have been recognized. Unless doctors are made aware of the need to explore the possibilities of occupational causation of disease conditions, and unions and similar groups obtain and disseminate available information as to possible hazards and their consequences,

the best statutory provisions, administrative techniques and benefits will be of no use to a substantial number of individuals who never get into the compensation system at all. In addition, while one might be accused of naivete in stating that employers must also be looked to for such direction, there certainly exists an obligation on their part to advise employees of possible health hazards, and to use plant nurses and physicians in a manner which assists rather than hinders the discovery of causative links between employment and disease. As an "incentive" for employers to provide such assistance, the possibility of law suits, where permitted, for gross negligence or intentional concealment of health hazards might well be considered.

When an individual worker is made to realize that he may have a compensable occupational disease claim, and applies for benefits, it becomes the duty of the administrative system to provide a mechanism that will do two things. First, it must provide to the greatest extent possible meaningful standards and criteria which will permit the voluntary acceptance of claims by employers in appropriate cases. Secondly, the system should make available the resources necessary to resolve contested cases fairly, and with the least possible expenditure of time and money.

The reference to "standards" and "criteria" may bring to mind some of the recent difficulties encountered in the administration of the Black Lung Law. One of the major areas of dispute that has existed in the enactment and administration of this law is that of the guidelines to be used in determining the existence of a compensable condition. We can learn from this experience, or at least be forewarned that the development of such criteria

must be undertaken with the greatest care and in a manner which makes possible the participation of all groups with a valid interest in the administration of the law and secures their support for the final product.

However, the concern for the need for standards must be tempered with a understanding that this type of administrative assistance is not feasible for determining the compensability of all diseases. In fact, the development of standards is practicable only in connection with those diseases that are widespread, of major concern to one or more industries, well established medically or in the process of being thoroughly investigated, and, for the most part, well publicized in both the popular and technical press. Examples of such diseases are silicosis, pneumoconiosis, byssinosis, and certain types of cancer.

Setting aside for the moment the problems which may arise as the result of large numbers of claims based upon a particular disease being made, these diseases represent the most fertile ground for the development of administrative guidelines. Because of the large number of workers who become involved with diseases such as silicosis, there is ample opportunity to develop an extensive body of medical information concerning the criteria for diagnosing a disease, and determining with some reasonable degree of probability its cause. While experience gained in administration of the Black Lung Law might lead one to be somewhat pessimistic as to the ability of any state agency to develop such criteria,

given the propensity of the interest groups involved to fight standards as "too liberal" or "too conservative", the prospects of having to determine the existence of a disease and its causality in each and every case, without any guidelines, with the attendant delays, litigation costs, and uncertainties should provide some incentive for compromise in developing standards.

This area of development represents a rather unique opportunity to bring together what are often competing interests, so that full use can be made of resources that are obtainable only through wide-scale cooperative efforts. It is extremely unlikely that any one state has the ability to "go it alone" in dealing with these kinds of diseases, while in turn, those with superior financial resources, such as the Federal Government, could greatly profit from the information and experience that can be provided by state agencies. One would hope that the abilities and resources of individual state workers' compensation agencies, the IAIABC, employer associations, labor unions, the National Institute of Health, medical research facilities and similar entities can be shared through cooperative undertakings so as to assemble as quickly as possible a body of useful data and information and provide for its dissemination.

The use of "information banks" is not at all unusual in both the medical and legal fields. Many lawyers' groups, for both plaintiffs' attorneys and defense attorneys, actively compile and disseminate briefs, case decisions, lists of

expert witnesses, lists of products that have been the subject of litigation and similar items of interest to their membership. As a result, those who choose to avail themselves of these services are quickly made aware of developments in other parts of the country, and have access to substantial bodies of information already developed by others, without having to start from scratch.

Similarly, the medical profession makes valuable use of institutions such as regional poison control centers and the Center for Disease Control to obtain prompt access to a large segment of the data available concerning many health problems. If such programs were formalized and actively pursued within the framework of occupational disease claims administration, many problems could be eliminated or at least lessened by virtue of an individual agency's ability to easily acquire a great deal of information from other jurisdictions at a cost significantly less than had the agency been required to develop the information on its own.

In addition, there appears to be a need for similar information sharing procedures within individual states. Many decisions concerning occupational disease claims are made at a level of adjudication in which the final decision is not published for general distribution, and, as a result, in the absence of an appeal the very existence of a case may go unnoticed. If steps are taken to "flag" cases involving occupational diseases, and to gather and index the information garnered from such cases in a central location, some cases

that otherwise would have been litigated might very well be amicably resolved, and the scope of information available for use in cases that have to be litigated will be increased.

However, the use of the procedures just described does not and cannot represent the total answer to the problems faced in administering occupational disease claims. Given the best of standards, there will always remain a body of cases which must be litigated, because of disputes concerning the factual basis for a claim, medical interpretation of the available facts, and similar concerns. In addition, while there is hope that the intelligent use of guidelines will help minimize opportunities for litigation in cases involving diseases, there remain hundreds of diseases which are not as wide spread, or as well known, or as "popular" as those previously described. While these diseases may not be deemed important when considered within the context of the overall problem of occupational disease coverage, they are, certainly important to the individuals who happen to contract them, and it is the obligation of the system to provide prompt, efficient and equitable resolution of such claims, despite the additional problems which may be faced as a result of the rather infrequent incidence of a particular disease.

Unfortunately, it is in these kinds of cases that the claimant is placed at his greatest disadvantage. All sorts of technical information, such as the level of past occupational exposure, must in many cases be obtained, medical tests

undertaken, doctors found with sufficient expertise to testify intelligently regarding a particular disease, and similar problems resolved by the claimant if he is to carry his burden of proof and establish the basis for a claim. In this undertaking he is usually met with the additional handicap of having presumptions which are contained in most compensation statutes for the purpose of assisting claimants limited in their use to cases not involving occupational diseases.

On the other hand, the employer, and its insurance carrier if one is involved, are in a far better position to defend the claim. They generally have at their disposal superior financial resources and the ability to use industry contacts to obtain information necessary for a proper defense. Further, employers and carriers are often in a position to gain access to physicians retained by trade associations and similar groups to help defend claims brought within a particular industry or industries throughout the country. Because of their constant contact with cases involving a specific disease, these physicians make very convincing witnesses. If their testimony is unopposed by testimony from equally well qualified individuals the decision may go against the claimant by virtual default regardless of the accuracy of statements made by the employer's expert witness.

One suggested solution to this situation is to remove the burden of proof from the employee and place the "burden of disproof" upon the employer. Not even taking into

consideration whether this type of procedure would result in all manner of unfounded claims being brought, it is extremely doubtful that on a practical level such a step would have a profound effect on an individual claimant's ability to sustain a claim. Regardless of who may have the burden of proof, and of what presumptions may be applicable, most cases boil down to a question of believability and reasonableness of one side's witnesses against the other's. For the most part, the resolution of individual cases is determined more by the quality of the evidence than by presumptions and burdens. Obviously, the attitude of a referee or judge in tending to favor claimants or employers, or in giving the benefit of the doubt to the claimant, will have an impact on the eventual outcome of a case, but again this may hold true regardless of the existence of presumptions or burdens.

The difficulties faced by claimants due to lack of access to resources does not mean that claimants are totally helpless and unable to emerge victorious in contested occupational disease claims. To the contrary, employers also suffer from problems created by adjudicatory systems that do not make available and utilize the best medical and technical information obtainable. The majority of states permit, at some level of adjudication, a single individual to resolve contested questions of fact and medical opinion, generally accompanied by a considerable degree of discretion, limited only by a standard such as the requirement that findings be based upon "competent substantial evidence in accord with

logic and reason". This permits a fact finder who wishes to rule in favor of a claimant (or an employer, for that matter) for reasons of sympathy, bias, or other considerations not sanctioned by law, to reject the opinions of witnesses with much expertise, and accept the testimony of a general practitioner, for example, who may have never before dealt with the disease under consideration. The example may be extreme, but the hazard exists and is one of the problems that must be dealt with. Fortunately, it can be met with the use of the same procedures to be used in improving the claimant's position.

What is needed is a mechanism or mechanisms which will help provide the adjudicator with the widest possible range of relevant information and opinion available, so that his decision can be made from a position of knowledge.

Those who are at this juncture awaiting the revelation of some astounding proposal, never before heard of in the realm of workers' compensation administration, will be sorely disappointed. The basic structure for providing the highest caliber medical information available already exists within the present statutory framework of most workers' compensation laws. That is, the authority of a referee or judge or commissioner or other fact finder to appoint an independent examining physician or similarly described expert, to assist in the resolution of controversy. Unfortunately, for the most part these provisions have been used in a much narrower context, as a tool to enable a party to obtain an examination by a physician of its choice to counter testimony

to be presented by a physician selected by the other side. While this is not an inappropriate use of the mechanism, it is an unfortunately limited use of a potentially powerful tool. The use of such authority (coupled with the enactment of enabling legislation where these powers do not exist) can be redirected towards providing sorely needed medical expertise in cases in which such assistance has not been made available to the fact finder, due to the inability or failure of the parties to produce the necessary witnesses and evidence.

A number of states already provide a specialized procedure designed to provide this assistance in occupational disease cases (for either all occupational diseases or certain diseases only, such as silicosis) through a requirement that such cases be presented to a special medical board for evaluation and/or decision.¹²

The use of such mechanisms is a step towards providing proper resources for determining occupational disease claims, but they in no way guarantee an effective system. Unless the doctors who constitute the medical panel are competent and well versed in the field of occupational disease, the existence of the panel will serve little or no useful purpose. Further, there must be an ability and willingness to use additional consultants if a particular problem is beyond the expertise existing within the panel, as well as an ability and willingness to obtain the maximum amount of information available regarding each disease with which the panel is faced. Finally, the use of boards may

simply be inappropriate in a number of states or portions of states due to the difficulties inherent in requiring all occupational disease claimants involved in contested cases to go before such a board, when in fact the logistics of such appearances may constitute as much of a burden or hindrance as the other problems discussed above.

Implementation of a plan such as the one being recommended here is either very simple, or very difficult, depending upon how one views the political process within the particular jurisdiction under consideration. The reason is that while for the most part this proposal does not require great expenditures of funds, it does require state agencies that are willing to actively undertake a program of pooling available information concerning occupational disease, and to amend laws and regulations where necessary so as to give adjudicators the authority to make use of this information, as well as the use of the best possible medical evidence available.

More importantly, the bane of compensation programs everywhere, the incompetent commissioner (or judge, or referee, or deputy) can make the best of statutory intentions meaningless. It should be obvious that a judge who is incapable of using the available tools, or is unwilling to do so, or is, for whatever reasons, not going to render an intellectually honest decision, will totally destroy the effectiveness of this program, as well as that of any other program. If competent personnel cannot be found and appointed

or elected to fill these positions, then no amount of intricate procedures, special boards or complex data gathering mechanisms will prevent the harm that can be done to the system. Appellate bodies and other review mechanisms are generally not structured to deal with other than the most flagrant abuses involved in the determination of questions of fact. More importantly, if proper trial level personnel who have the authority to make findings of fact cannot be obtained, there is little reason to believe that appellate level personnel will be any better, or that doctors chosen for medical boards will be of a higher caliber.

No matter how many intricate schemes are proposed to administer occupational disease claims, one is inescapably led back to the conclusion that it is not the statutory enactments which in the final analysis determine the efficacy of a program. It is instead the people involved in the implementation of the program who will determine its success or failure. Certainly occupational disease claims present numerous issues not found in dealing with accidental injuries, and these differences cannot be ignored. However, these problems are not so unique so as to require radical changes in the way in which compensation claims are administered. In fact, the major problem regarding occupational diseases in terms of the compensation system is not the administration of claims, but the resolution of the question of whether the system is appropriate for or capable of dealing with either diseases in general, or certain kinds of diseases.

It is becoming obvious that an insurance-funded program may not be the proper vehicle for compensating disease victims. Insurance is for the most part meant to deal with known hazards, and those whose frequency can be predicted with some degree of accuracy within a large population. It now appears that there may very well exist a number of substantial health hazards within American industry resulting from long-term exposures to agents whose toxicity has for many years gone unnoticed. If some publicly expressed fears hold true, we are about to reap the unfortunate harvest of years of ignorance, and as a result see many cases involving serious disability and/or death due to occupational causes which were never foreseen or considered in the rate-making process. As a result, the financial drain on the system may be disastrous.

In addition, medical research is beginning to reveal that many disease conditions, including heart disease, are, not the result of a single causative factor. Instead, they are brought about through constant exposure, on the job and off, to conditions related to the way that people live, and to the environment. It is arguable whether or not the compensation system, and in turn industry, is the proper place to put the financial burdens arising from diseases caused only in part by occupational exposures, and in an equal or greater degree by non-occupational factors.

It is these questions that present the major problems facing the compensation system. Once they are resolved, those who are engaged in the administration of compensation

claims can, if they are so motivated, devote the resources required for the implementation of the programs necessary to deal with the disease claims deemed to be a proper concern of the compensation system.

FOOTNOTES

1. The Report of the National Commission on State Workmen's Compensation Laws at 50 (1972).
2. Id. at 50.
3. Id. at 50.
4. ID. at 137.
5. Chapter 5, title 26, Code of Alabama § 313 (34) (1975)
6. Arizona Rev. Stat. § 23-901.01.4.
7. 269 A.2d 525 (Pa. Super. 1970).
8. 255 So.2d 260 (Fla. 1971).
9. But see, e.g., Cal. Labor Code, Div. IV, §3208; Wis Stat. ch. 102, §102.01(2)(d) (1972).
10. Arkansas, Oklahoma, and Tennessee
11. 483 S.W. 2d 488 (Tex. Civ. App. 1972).
12. E.g., Ariz. Rev. Stat. tit. 23, §23901.03 (1973);
W. Va. Code Ann. §2346a (Supp. 1975).

ADMINISTRATIVE ASPECTS
OF
HANDLING OCCUPATIONAL DISEASES

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ADMINISTRATIVE ASPECTS OF HANDLING
OCCUPATIONAL DISEASES

Administration of occupational disease workers' compensation claims in the broadest sense encompasses the various processes through which claims are handled within the system from inception to conclusion. What specific steps are involved will vary according to both statutory and case law, administrative rules and regulations, informal unwritten procedures--the "laws of the halls"--and according to the varying degrees of capability of the persons in the system to carry out effectively these steps. Administration is necessarily enmeshed with the legal aspects of occupational diseases. This nearly inseparable relationship has been and will continue to be evident as we explore occupational disease in the workmen's compensation system.

In most instances, however, administration involves at least the following:

1. The responsibility of notice, involving brochures and other informational methods used to advise employees of workers' compensation coverage, including types of occupational disease claims allowed.
2. The responsibility of delivery, involving the various forms which must be filed or completed to properly have a case processed and benefits commence.

-2-

3. The responsibility of reporting, involving information which must be filed with employers and compensation agencies.
4. The responsibility of obtaining and evaluating medical determinations.
5. The responsibility of conceiving and maintaining adequate review processes for uncontested claims.
6. The responsibility for adjudicating controverted claims.
7. The responsibility for establishing processes for review by the Administrative Agency of controverted claims.

This statement of responsibility is not intended to be exclusive, but it does provide a general outline of administrative procedures.

This discussion will attempt to review the overall administrative process as it relates specifically to occupational disease claims.

In reviewing existing procedures we were greatly assisted by the Workers' Compensation Standards Division of the Inter-departmental Workers' Compensation Task Force who conducted an informal telephone survey of the 50 states with reference to their occupational disease administrative experience. Inasmuch as the survey was carried out within a tight time frame, by telephone, and was subject to the limitations of sometime conflicting local interpretation, specific reference to exactly the number of states doing this or that procedure will be omitted due to possible inaccuracies. Not intended to be a

statistical survey, the telephone review did surface many of the concerns, practices, accomplishments and areas of needed reform within the system. The ensuing discussion relates substantially to the results of this survey.

A rather basic area of concern was put forth in the question, "How are medical determinations of causal relationships made for occupational disease cases?" Quite expectedly this prompted a variety of answers.

First, determination of causal relationship in occupational disease cases are made by the treating physician who may be initially selected by the employer or by the employee or from a panel of physicians provided by the compensation agency. This physician would submit a report to the agency for administrative review. If no dissatisfaction was evidenced by any of the parties and if the compensation agency approved the agreement for compensation as being in compliance with the law, then compensation would commence. If a dispute arises, then the physician or physicians must testify or submit reports at a hearing where the matter is adjudicated. This was a rather widely adopted method of medical determination.

A second though less frequently used method accomplishes the determination by referral to a medical board or panel. An occupational disease claim is referred to this group or a member of this group for an in-depth work-up; their opinion is relayed to the compensation agency. The collective opinion may be binding or one of the parties may still have the right for a hearing to

-4-

ultimately determine the matter or in some instances request further medical examination from the compensation board.

A third method utilized involves employee referral to a statutory advisory commission on specific diseases, such as silicosis or asbestosis. Of course, these statutory procedures spell out various steps a claimant must pursue to have his claim processed.

And finally, there are blends of these methods. The survey did tend to reflect that states utilize various methods depending on the nature and volume of the particular state's occupational disease problem. For instance, if the medical profession appears to be divided into "plaintiff's physicians" and "defendant's physicians"-- then a board or panel is frequently used to assure impartiality. If a particular disease is prevalent in a state, then a special board or panel to deal with this disease may be necessary. In those states with little or no occupational disease experience there is, of course, less specialized medical determination procedures.

The next question was, "Does your agency break out the number of occupational disease claims filed, as distinguished from injury claims?"

The message that clearly came through in response to this question was simply--there is no clear message; a uniform system of statistical reporting of occupational disease just does not exist at this time in the field of administration. Although several states did indicate that a distinction was made between claim for

-5-

occupational diseases and those for regular injuries, an in-depth analysis of occupational disease claims was available only in heavily industrialized states.

We then asked, "Are you aware of any work related diseases in your state which are not compensable under your workers' compensation law?" (Note that this question deals with the terminology of the National Commission--"work related.")

While many of the states responded negatively to this question, it also may be that many were unfamiliar with that term. Certainly the implication of "work-related" at first blush is that this is much broader than the statutory language in most states. Recently, there have been a number of relatively broad occupational disease statutes enacted. Even these, however, are frequently criticized as being limited to diseases peculiar to a particular employment; we can only speculate as to how many disease are being thereby omitted from coverage. In such cases, however, some states, by case law or administrative fiat, have allowed the unusual case to be compensated. These "restrictive broad" definitions often become a problem where a particular disease has a tremendous cost impact; in such cases employers may urge, with varying degrees of success, a conservative definition. (Administrators noted--not recommended--that successful direct action litigation can effectively dissuade the overly restrictive definition that removes the claim from the jurisdiction, and limited liability, of the state's workmen's compensation law.)

Next we asked, "If you had personal authority to change your present state law, what changes would you make to improve the present administration of occupational disease claims?"

The most often cited--the most significant--changes recommended were:

1. The need to broaden or improve the definitions of occupational diseases. Also, the need to eliminate schedules of occupational diseases.
2. The need to develop better ways to obtain medical determinations of occupational diseases.
3. The need to develop reasonable presumptions.
(It is clear, and persuasive, that carefully drawn presumptions could eliminate many of the major problems of adjudication and could shorten the administrative time and expense of processing occupational disease claims.)
4. The need to repeal waiver provisions in occupational disease statutes.
5. The need to repeal restrictive statutes of limitations.

From a battery of rather general questions posed throughout the states, we received various interesting responses.

Few states, generally protortionate to their occupational disease case load, have developed special administrative rules or regulations for occupational disease claims. In the areas of silicosis, asbestosis, and bysinosis, some states have special rules, but these states are exceptional.

The disease which is reportedly most frequently compensated is dermatitis; not surprisingly, it also appears that this is the

least costly on a per case basis to employers. The most expensive diseases are the obvious--silicosis, asbestosis, cancer, chemical related diseases, bysinosis, and other respiratory diseases.

As to how employees are made aware of the fact that occupational disease claims are covered by workers' compensation--numerous methods are employed; general plant notices, special brochures, educational seminars, union meetings, all seem to be the most common. Brochures and plant notices appear to be of minimal practical value. Direct employee education seems most effective when provided through union leadership, employee representatives, or through local medical practitioners.

Occupational disease cases take longer and cost more to process than normal injury cases when contested due to the frequent complexity of central issues, such as determination of last employer, statutes of limitations problems, medical problems, etc.

Few states have conclusive presumptions dealing with occupational disease cases. Presumptions, where available, are in the nature of rebuttable presumptions.

What conclusions can be drawn from this survey of state administrators?

First, occupational disease workers' compensation claims have heretofore been a small percentage of claims in the workmen's compensation scene, but appear to be emerging as a significant problem in the area of administration.

Second, a significant number of cases may not be getting into the system due to lack of recognition by the medical profession, employees or employers; compensation boards are limited in their ability to respond to this problem.

Third, refinements in the workmen's compensation law in the area of occupational disease are needed in many states; these refinements include improved occupational disease definitions, better ways for determining medical causation, and broader statutes of limitations.

Fourth, and perhaps obviously, the potential cost to both employers and employees of occupational diseases is great. All parties affected by occupational disease--employees, employers, carriers, the medical and legal profession, and administrators--must seek a mutually effective incentive to first prevent and then to recognize, treat, and adequately compensate for occupational disease.

Underlying the effectiveness of the entire administrative process, of course, is the need for competent people to meet the responsibility of administering the various workmen's compensation acts. Compensation agencies are aware of the frequent criticism leveled at them for "loose" or liberal interpretation of the compensation law, particularly in the area of occupational disease. Admittedly, in some cases this is justifiable criticism; however, it appears that this practice more often develops where statutory benefit and coverage levels are inadequate.

Finally, workmen's compensation administrators view with all those here and with all those represented here the emergence of occupational disease as a uniquely complex area of the

-9-

workmen's compensation system, and administrators have already begun scrutinizing their authority, their responsibility, and their expertise to determine whether or not they are prepared or can be prepared to adequately meet this challenge.

Although administrators certainly won't guarantee you or the public that they can effectively meet this challenge, they can guarantee you and the public that NO ONE can handle this problem alone.

STATEMENT

By

Dr. Thomas F. Mancuso

February 12, 1976

CONFERENCE ON OCCUPATIONAL DISEASE

Interdepartmental Workers'
Compensation Task Force

I should like to comment on the sections of the Senate Bill 2018, that relate to employment-related diseases. I have also some suggested recommendations relative to specific needs, that require consideration in the legislation designed to improve our worker's compensation system.

My first consideration is an attempt at interpretation of what appears to be a very clear statement of Section 6(A) of 2018 which states in effect that the Secretary of HEW is authorized and directed to undertake a study of diseases related to employment, etc. to make recommendations for appropriate standards for determining (a) whether such a disease arose out of and in the course of employment; (b) whether death or disability was due to such disease. Such standards may include reasonable presumptions whenever appropriate, etc.; (c) on the basis of the study provided under section (a), new or additional standards should be promulgated for determining whether a disease arose out and in the course of employment -- or whether death or disability was due to such disease.

The point I am making is, there already exists a large number of severe diseases for which a definite occupational relationship exists, for which no new studies are required. Some of these

were identified in the Williams-Javits Bill of 1973, namely -- silicosis, asbestosis, berylliosis, diatomite pneumoconiosis, talcosis, shavers disease, siderosis, lung cancer, mesothelioma, as well as any respiratory disease for which a miner qualified under the Coal Mine Health Act of 1969, etc. (In the case of lung cancer, only certain industrial relationships have been established, and in further studies additional industrial causes are most likely to be discovered. This is true for a number of different types of cancer).

Now, relative to the diseases mentioned, for example, silicosis, asbestosis, etc. the medical evidence of the disease is final proof -- of the specific effect of that prior occupational exposure. When such medical effects occur more than a presumption exists. This is readily apparent.

I see no need to require or set up additional criteria, when the occupational disease has already been established, and exists. Theoretically, an injurious exposure is any combination of the agent (toxic dusts, fumes, etc.); The environment (exposure conditions and duration); and the host, the individual, that combination produces the disease. The presence of a specific disease, a disease already established and medically recognized, as due to specific substance and work exposure such as in silicosis, is evidence in itself that injurious exposure has occurred. The disease means and represents that the injury has actually occurred as has been demonstrated by physical and x-ray examination.

There is a marked variation in susceptibility or resistance of individuals. Cases have been observed of some persons exposed

to small amounts of silica who have developed more disability than other persons who have been exposed to greater amounts of silica.

Further, "there is increasing evidence that the onset of silicosis can be hastened by the inhalation of other substances along with silica. The alkalinity associated with sand in a scouring preparation was reported¹⁷ to have caused silicosis in from 20 to 26 months ("galloping" silicosis) in a small group of exposed individuals; the silica dust concentration was tremendously high as far as can be gathered from the original report. Rapidly progressive silicosis has been previously reported in this country¹⁸ from the same cause. Talcosis of unusually rapid development (16 to 24 months) was reported¹⁹ also under circumstances of excessively high talc concentrations. Flouride in the form of fluorspar, in mixture with quartz, has also been reported²⁰ experimentally to induce more intense fibrosis than quartz alone although the latter may be present in only minute amounts (1 per cent) in the mixture."²¹

These comments on silicosis, are to emphasize the importance of the medical findings, in not only presuming but concluding an occupational relationship -- i.e., relationship to prior work exposure. This applies to the previous specific occupational diseases included in the 1973 Bill.

I believe the purpose for the inclusion in 1973 Bill was to help expedite and clarify the compensation procedures, for the respiratory diseases, to at least remove this group of diseases

¹⁷ Desoille, Tara, Delplace, & Cavigneaux, 14 Arch. maladies profes. med. travail et securite sociale 279-283 (1953).

¹⁸ Ritterhoff, 43 Am. Rev. Tuberc. 117-131 (1941).

¹⁹ Alivisatos, Pontikakis & Terzis, 12 Brit. J. Ind. Med. 43-49 (1955).

²⁰ Policard & Collet, 14 Arc. maladies profess. med. travail et securite sociale 117-122 (1953).

²¹ Stokinger, Toxicologic Aspects of Occupational Hazards, 7 Ann. Rev. Med. 179(1956). References 17,18, 19, 20 & 21, supra, are from Dr.Stokinger's article.

from further delaying and unnecessary litigation. In my opinion, any worker who sustains such occupational diseases certainly are entitled to compensation without delay and unnecessary complicated legal procedures. Serious consideration should be given for the inclusion in the final Version of S2018, to allow for these already demonstrated specific occupational respiratory disease, to avoid any necessity to restudy these diseases.

I am concerned too, that when the diagnosis of such specific occupational respiratory diseases has been made, that the certain restrictions relative to date of filing, date of prior exposure, or duration of exposure, stage of disability, that such restrictions not be used, to deny compensation for the disease already sustained.

Silicosis is a good example -- in the past, and I believe it is true now -- silicosis claims have been denied in certain states, because no injurious exposure occurred within the last 8 years. In essence, a person may have total disability due to silicosis and be denied compensation because exposure did not occur within the 8 years-period. Further, in the States, silicosis is not compensable unless there is total disability. The meaning of total disability is, for all practical purposes, near death.

It is scientific wrong and humanly unjust to have such limitations on silicosis or other respiratory diseases to confine them to total disability. The tremendous medical and hospital bills, and the medical cost, during the years, that a worker with various stages of silicosis, sustains, are medical costs due to his occupational injury. In the present functioning in various states, the

worker not only has his health ruined (and the effects on this family), but he even has to pay for many years for the injury caused and induced not by himself -- but rather by his work.

In Section 6A -- of Senate Bill 2018, my interpretation of the directive to conduct studies of industries to identify work-related illness and disease, is related to the concept of identification of similar types of respiratory or other diseases as already specified in the 1973 Bill. This concept, in my interpretation relates to the identity of a single type of lung disease -- in some particular industry. This will be possible, or meaningful, in industries or processes engaged in the manufacture or processing of a specific chemicals or products. However, the majority of industry and industrial exposures are quite complex, with, perhaps, hundreds of different types of exposures, and large number of different health effects, but not necessarily one "single" type of major effect as occurs with byssinosis, etc.

The point I am leading into, is that the recognition or identification of a work-related illness or disease, should not be dependent upon, nor wait upon the conduct of an industry study. The hundreds of thousands of industries, the years and man-power required, means that it will be decades before the magnitude of the occupational diseases are uncovered from that approach.

In essence, the recognition of a work-related disease by compensation authorities in the respective states, should not wait upon such studies -- when an occupational illness occurs, as medically diagnosed by the physician to be related to the work exposure -- that is an occupational illness.

Within this context, I should like to refer to degrees of probability, or of presumption.

There is no way to list all the occupational illness, and effects that have occurred, or are occurring or will occur from the hundreds of thousands of different work exposures, or for the thousands of different chemicals in the work environment.

Any preconceived motion that such a list can or should be prepared is in error, because studies of the thousands of trade-name products, and the work exposures have not been conducted.

There is, however, well documented and professionally accepted, apparently 500 different types of dusts, fumes, mists, gases and other stresses, etc. for which harmful effects have been medically acknowledged.

These have been listed in the Air-Contaminant Standards adopted by OSHA and in other standards.

The question as I perceive it, relative to the improvement of coverage on occupational diseases, is how can we reasonably determine whether an illness or disease can be presumed to be work-related.

RECOMMENDATIONS

I believe that one major approach would be to establish presumption of work-related causation to include:

- 1) the specific respiratory diseases as stated in the 1973 Bill -- asbestosis, silicosis, byssinosis, etc.;
- 2) establish presumption relative to specific substances listed in the Air-Contaminant Standards -- (which

- relates to approximately 500 chemicals and agents), when the worker at that work location develops an illness, whose symptoms are medically known to be associated with that particular toxic agent;
- 3) establish a reasonable presumption for chemicals and toxic agent -- [(kepone) (example)] not already in the Air-Contaminant Standard, when the illness or harmful effects occur due to a particular chemical with medically recognized symptoms and findings;
 - 4) establish reasonable presumption of work-related causation, for those illness, diseases or harmful effects, when the correlation^{of}/work exposure and health effects, indicates a pattern of similar health effects among other workers similarly exposed in the same work facility. (example, kepone) In essence, if a group of workers, working at the same place, doing similar type of work are exposed to the toxic agents, come down with similar symptoms and health effects a pattern has been established. A work-related illness has been established.

In order for the compensation agencies to properly administer their responsibilities relative to evaluation of cases pertaining to occupational disease, -- I do believe that the S]018 Bill should include mandatory provisions to allow for correlation of work exposure and health effects; that should be made available for compensation evaluation.

RECOMMENDATIONS

- I The employer must maintain and retain all medical records accurate and complete pertaining to the employee with proper safeguards to ensure their retention and subsequent availability and completeness.
- II The employer must maintain and retain a listing and proper identification of all trade-name products used, in respective departments and work processes, and maintain and have available, all pertinent toxicological and safety data for each of the respective trade-name products used. Such records should be chronological in time, complete and accurate.
- III Employer must maintain and retain, listing identification of all other chemicals and hazardous substances used in the respective work places, and have available the toxicological and safety data pertinent to each of these hazardous substances. Such records shall be accurate, and complete; and maintained chronologically in years.
- IV Employer must maintain and retain accurate and complete records of environmental tests and measurements of all chemical and other injurious agents, for each job location in various departments or processes, not only for toxic substances on the standards, but all toxic substances in the work

place. The records shall be chronological in time and accumulative, and designed to permit identification and correlation of prior work exposures for each employee at different points in time.

It is my opinion, that the compensation laws, should require these essential components, that are necessary for the compensation agency -- and the physicians evaluating each case -- the environmental exposure data and the medical records.

There are other data requirements relative to the work process which are really necessary -- that could be considered, these are:

- 1) the chronological records on the presence or absence of ventilation -- and other protective control measures, etc.

Now, I should like to refer another important area -- the established fact that a worker may lose his or her job -- who files a claim for worker's compensation -- the real fear of fellow workers, fear to lose their jobs if they contribute information about a compensation case. This is a national problem, that prevents the recognition of occupational diseases and, therefore, prevents just compensation to which the worker is entitled.

RECOMMENDATIONS

1. It is my recommendation that the S2018 include proper provision to protect the workers relative to the filing of com-

pensation claims or for the giving of information about work conditions, etc. I am recommending that the section in the OSHA Act Section 11c and its components, be incorporated in the compensation --

- "(1) No person shall discharge or in any manner discriminate against any employee because such employee has filed any complaint or instituted or caused to be instituted any proceeding under or related to this Act or has testified or is about to testify in any such proceeding or because of the exercise by such employee on behalf of himself or others of any right afforded by this Act.
- "(2) Any employee who believes that he has been discharged or otherwise discriminated against by any person in violation of this subsection may, within thirty days after such violation occurs, file a complaint with the Secretary alleging such discrimination. Upon receipt of such complaint the Secretary shall cause such investigation to be made as he deems appropriate. If upon such investigation, the Secretary determines that the provisions of this subsection have been violated, he shall bring an action in any appropriate United States district court against such person. In any such action the United States district courts shall have jurisdiction, for cause shown to restrain violations of paragraph (1) of this subsection and order all appropriate relief including rehiring or reinstatement of the employee to his former position with back pay.
- "(3) Within 90 days of the receipt of a complaint filed under this subsection the Secretary shall notify the complainant of his determination under paragraph 2 of this subsection."

2. I do believe too that the legislation should provide some mechanism, that will prevent or alleviate the practice of "letting a worker go" -- actually discharging the worker because he has become disabled and no longer able to do that particular work -- even though it was the work that caused that disability or loss of arm, etc. in the first place. The problem places the worker

in double jeopardy -- Actually, it is triple jeopardy, because the man will not be able to get a job elsewhere because of that disability. Society then has to bear the burden of the costs, while the worker suffers from the disability, and the company is no longer held responsible, once the worker has been let go.

I do not presume to know the solution, but this problem must be recognized -- and industry must continue to bear the responsibility when the work environment causes harm to the worker.

The way the present system operates, the companies can let go and they do let go the workers who are disabled or are compensation risks. The foundry workers were the first to learn that tragic lesson, great many years ago.

In reading the many important statements by Senator Javits on this S2018, there is one point that can be implemented now in the legislation that would greatly help in occupational disease compensation.

RECOMMENDATIONS

1. In essence, require that fringe benefits such as pension and health insurance coverage be continued during the time of an injured worker's period of total disability. As Senator Javits stated, it is "obvious that loss of such fringe benefits can be a significant and tragic fact to the injured worker". The family of the worker can be severely adversely affected by the lost of health insurance -- and this should be continued during the period while compensation case is being considered and during the period of rehabilitation.

DEFINITION OF OCCUPATIONAL DISEASE

In terms of definition of occupational disease, the S2018 specifications in Section 5, and Section 3(7) of S2018 is decidedly more precise and pertinent for occupational disease -- and is recommended rather than that of HR9431. The definition in S2018 - 1975 differs from the 1973 Williams-Javits Bill -- in the following way: the S2018 - 1975 -- specifies -- "An injury should be deemed to have arisen out of and in the course of employment if work-related factors were a significant cause of the injury."

In 1973 -- says the work related factors must be "a contributing cause of the injury".

I would prefer the 1973 phrase -- a "contributing cause of the injury."

B L A C K L U N G

A Study in Occupational Disease Compensation

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Occupational Diseases and
Workers' Compensation

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BLACK LUNG

A Study in Occupational Disease Compensation

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January 15, 1976

I. INTRODUCTION

Not too many years ago, the open discussion of industrial and environmental disease among representatives of industry, labor, government, and health and legal professions would not have been a realistic possibility. That time has passed and the discussion is now taking place on a number of fronts. There is widespread agreement that toxic and disease producing substances should be removed from the environment and that an extensive effort must be made to identify and control such substances.

In this regard, epidemiologists, industrial engineers, economists, and legislators are facing unprecedented challenges. The job ahead will by no means be an easy one.

While disease prevention is generally recognized as the ultimate solution, there is, beyond the industrial body count and mounting volume of data, an equally imminent individual human need for solutions.

Although the work related injury is as old as the concept of employment itself it was not until 1880 in Great Britain, and 1902 in the United States, that the employer liability principle found its way into Anglo-American

jurisprudence.¹ These first workmen's compensation laws were constructed to afford relief only to those persons who suffered a time-definite, unexpected, employment related accident and injury during the working day.² The identified occupational diseases such as lead and arsenic poisoning and certain latent dust-related diseases were not unknown at that time but the laws enacted were not adequate to provide benefits to the disease victim. Perhaps, most importantly the known diseases lacked that "accidental" quality that was essential to the successful prosecution of a compensation claim.

There is no need to recount the halting slowness with which recognition of the right of disease victims to workers' compensation found its way into the law. That story is well known. It may be that it takes a dramatic and traumatic event such as Gauley Bridge or Farmington to change the laws, but for whatever reasons the laws have changed over the years. In 1917 when the Public Health Service concluded the first dust study in the United States there was no compensation coverage

¹ National Commission on State Workmen's Compensation Laws, *Compendium on Workmen's Compensation*, pp., 15-17, (Washington, D.C., 1973).

² See 1 A. Larson, *Workmen's Compensation Law* § 4.00-5.00; and V. 1A. § 41.31; (New York, 1972).

for occupationally induced disease.³ Some measure of relief could be obtained by resort to the courts and the common law but success in that regard required a showing of negligence or fault on the part of the employer, and that was particularly difficult. By 1934 in the wake of Gauley Bridge six states had enacted compensation laws under which benefits could be provided for silicosis.⁴ By 1952 that number had risen to 18 states.⁵ The Report of the National Commission on State Workmen's Compensation Laws found 41 states providing full disease coverage in 1972.⁶ As of January 1, 1975, 45 states and the District of Columbia provided full workers' compensation coverage for all occupational diseases, and the remaining five states provided partial coverage or coverage for scheduled diseases.⁷

³ Victoria Trasko, "Socioeconomic Aspects of the Pneumoconioses," Archives of Environmental Health, 9:521 (1964).

⁴ Id., p. 523.

⁵ Id., p. 522.

⁶ The Report of the National Commission on State Workmen's Compensation Laws, p. 50, (Washington, D.C., 1972).

⁷ Chamber of Commerce of the United States, Analysis of Workmen's Compensation Laws, pp., 14-17, (Washington, D.C., 1975).

The picture which emerges from these statistics is not particularly negative and, in fact, might lead back to the epidemiologists et al. for more diseases to add to the list. The problem of workers' compensation for occupational disease is, of course, not that simple. The space between what the law provides and the proof of individual entitlement is often difficult to bridge.

Since July 1, 1973 the United States Department of Labor through its Office of Workers' Compensation Programs has been charged with the responsibility for the administration and enforcement of section 415 and Part C of Title IV of the Federal Coal Mine Health and Safety Act of 1969, as amended by the Black Lung Benefits Act of 1972.⁸ These provisions primarily establish a Department of Labor administered and employer financed workers' compensation program for coal miners who are totally disabled due to coal workers' pneumoconiosis (black lung) and the sequelae of that disease, and for the survivors of miners who have died due to or while totally disabled by that disease. The singular purpose of this compensation law provides a

⁸ Public Law 92-303, 30 U.S.C. 901 et seq.

unique opportunity to study the theory and practice of providing occupational disease benefits within the context of reasonably traditional workers' compensation principles.

II. METHODOLOGY

While the Federal Black Lung Benefits Act of 1972 utilizes many principles which have evolved from the experience of state compensation systems, primary among which is the notion of individual employer liability, there are a number of points of departure. The Act is the first compensation law especially tailored to meet the needs of the victims of a single occupational disease.⁹ The law also marks the first Federal effort in those areas of workers' compensation traditionally reserved to the states.¹⁰ Perhaps most importantly, the Act and implementing regulations¹¹ are unique in that they attempt to

⁹ Prior to the passage of the Federal Act on December 30, 1969, Alabama (1952), Pennsylvania (1965), and Virginia (1968) provided specific coverage for coal workers pneumoconiosis within the context of their already existing traumatic injury compensation laws.

¹⁰ The workers' compensation area is not, however, new to the Federal bureaucracy. The Department of Labor administered Federal Employees' Compensation Act was adopted in 1916 and the Longshoremen's and Harbor Workers' Compensation Act in 1927.

¹¹ See Subpart D, 20 CFR Part 410.

define a compensable condition both from the medical and socioeconomic standpoint in minute detail.

It is the intention of this paper to permit the Federal Black Lung Benefits Program to tell its own story, to develop a phenomenology of its own which may justify or condemn it, which may point out new directions in occupational disease compensation, or which may simply teach some hard lessons.

The authors have selected as a focal point for this study the expectations of those diverse groups which came together to make the Federal black lung law a fact. Among these groups are, labor and in particular the United Mine Workers of America, and the Black Lung Associations, the coal and insurance industries, the health professions, and the Federal Government. It is hoped that through the actions and reactions of these groups on a background of the operational realities of the Federal Black Lung Program, the black lung story will emerge.

III. HISTORY

There is a mystique about coal miners and the coal mining industry which has always captivated the American people. Perhaps it is the danger of coal mining. Over 100,000

miners have died in coal mine accidents since 1884.¹² Perhaps it is the working conditions, or the rural mountain setting, or the violence which has accompanied the history of the miner's unions. The miner and mine operator are often depicted as rugged hard fighting individualists. Even today notwithstanding the homogenization of life styles in the United States, the mystique persists.

It is possibly for this reason that the public has demonstrated an increased awareness of and responsiveness to the needs of coal miners.¹³ This awareness and responsiveness is today augmented by a renewed recognition of coal as a critical natural resource.

The recognition of black lung as a matter worthy of attention was, however, slow in coming. As early as 1806 certain physiological changes in the lungs of autopsied coal miners were noted by Laënnec in a Memoir delivered to the Faculty of Medicine of Paris.¹⁴ By 1831 medical

¹² Officer's Report to the United Mine Workers of America 46th Constitutional Convention, p. 163 (1973).

¹³ See Officer's Report to the UMW of A, supra pp., 57-71.

¹⁴ A. Meiklejohn, "History of Lung Diseases of Coal Miners in Great Britain," Brit J. Indust. Med. 8:128 (1951).

researchers in Great Britain associated the "black lungs" of coal miners with their exposure to dust in coal mine employment.¹⁵ The controversy over black lung raged for many years in the British medical journals until in 1943, when coal workers' pneumoconiosis became compensable under British law as a disease distinct from silicosis.¹⁶

The confusion between black lung and silicosis was not so easily dispelled in the United States. Perhaps due to the influence of Gauley Bridge, the notion that silica dust was the only harmful employment generated dust seemed to persist in the United States generally until the 1960's¹⁷ and even today some state compensation laws define black lung in terms applicable primarily to silicosis. Despite the substantial progress made in Great Britain both in terms of research and workers' compensation the attitude toward coal workers pneumoconiosis in the United States was "characterized by obscuratism and a persistent refusal to face the facts."¹⁸ Part of this was no doubt due to

15 Id.

16 Id., 9:208 et seq.

17 Lorin E. Kerr, "Coal Workers Pneumoconiosis," Arch. Environ. Health, 16:579, 580-582 (1968).

18 Estie Stoll, Coal Mining: The Way to Dusty Death, in Cong. Rec. H 10806 (daily ed. November 10, 1971).

the seeming resistance of scientists in the United States to tackle the admittedly difficult diagnostic and epidemiological problems presented by black lung and part was undoubtedly due to the perceived economic consequences which might have befallen the coal industry if it were burdened with the liability of black lung compensation.

In November 1968 the tragic death of 78 miners following an explosion and fire in a coal mine in Farmington, West Virginia was, "the catalyst that has brought us together."¹⁹ When Congressional hearings first commenced in February 1969 the intention seemed to be to reform the coal mine safety legislation of the past three decades.²⁰ It was not long, however, before the topic of black lung came to dominate the hearings. Dr. Jethro Gough's dramatic televised presentation of black lung sections to the Senate subcommittee had tremendous impact. The Congress was resolved to act and act quickly. The very few coal

¹⁹ Legislative History, Federal Coal Mine Health and Safety Act, 91st Cong. 2d Sess. (hereinafter, Legislative History), 7 (1970).

²⁰ Public Law 77-49; Public Law 82-552; Public Law 89-376.

industry representatives who testified negatively with regard to black lung compensation per se, were rebuffed.²¹ However, the coal industry cooperated with Congress in moving in the direction of meaningful legislation to make the coal mines a more healthful place to work.²²

Extensive and detailed testimony was delivered by a number of physicians with coal field experience, and by employee as well as government representatives outlining the toll of life and health attributable to black lung. The Surgeon General of the United States estimated that "over 100,000 active and retired miners are afflicted with it."²³ Of 1,000 autopsies conducted in Beckley, West Virginia, 85% showed coal dust disease.²⁴ A considerable lexicon of cardio-pulmonary diseases and conditions were related to black lung and its effects.²⁵ Even with the vast amount

²¹ Hearings on S. 355, S. 467, S. 1094, S. 1178, S. 1300, S. 1907, S. 2118 and S. 2283 Before the Subcommittee on Labor of the Senate Committee on Labor and Public Welfare, 91st Congress, 1st Sess. (1969) (hereinafter, 1969 Senate Hearings), 1306-1310, see also Hearings on H.R. 4047, H.R. 42975 and H.R. 7976 Before the General Subcommittee on Labor - House of Representatives (1969) (hereinafter, 1969 House Hearings), 146-149.

²² See 1969 Senate Hearings, supra, Part 2, 541-599.

²³ Legislative History, supra, 905.

²⁴ 1969 Senate Hearings, Part 2, 641.

²⁵ Id., Part 3 A20-A28.

of evidence presented (well in excess of 5,000 pages), the earliest bills introduced in 1969 focused exclusively on dust control and mine safety. It was not until late in September 1969 and after Senate Bill 2917 was reported out of committee that two proposed compensation amendments were submitted. The compensation provisions were considered necessary in view of -

The incontestable fact that * * * the workmen's compensation programs of the States had utterly failed thousands of coal miners throughout the country who have become totally disabled or died from black lung.²⁶

In any event, the bill which emerged from the Conference Committee was quite different from its predecessors.

On December 30, 1969, the Federal Coal Mine Health and Safety Act became law. Title IV of the Act had as its stated purpose to --

provide benefits, in cooperation with the States, to coal miners who are totally disabled due to pneumoconiosis and to the surviving dependents of miners whose death was due to such disease; and to ensure that in the future adequate benefits are provided to coal miners and their dependents in the event of their death or total disability due to pneumoconiosis.

²⁶ Statement of Senator Javits, Cong. Rec. S. 17180 (daily ed., Dec. 18, 1969). See also Cong. Rec. H. 10063 (daily ed., Oct. 27, 1969).

The eligibility criteria contained in Title IV were, for the time, unique in that they incorporated three statutory presumptions to assist claimants in establishing entitlement.²⁷ Two of those rebuttably presumed a causal relationship between pneumoconiosis, or in the case of a deceased miner, a "respirable disease" and the miner's coal mine employment if that employment spanned 10 or more years. A third presumption, termed irrebuttable, made "complicated" pneumoconiosis when diagnosed by autopsy, biopsy, or x-ray, automatically compensable. Two agencies, the Department of Health, Education and Welfare (HEW) through the Social Security Administration (SSA) and the U.S. Department of Labor (DOL) were charged with the responsibility for administering the black lung program. Under the first part of the program (Part B), the Social Security Administration was authorized to pay benefits from Federal funds to miners who were totally disabled by black lung and to the survivors of miners who died because of black lung. The federally financed program was to run until December 31, 1972. All claims filed before that date were to be paid by SSA except those claims filed between January 1 and December 31, 1972, would serve to provide benefits during that "transition year" only. Claims filed subsequent to December 31,

27 30 U.S.C. 921(c).

1972, were to be filed under an applicable State workers' compensation law if such law was determined by the Secretary of Labor to provide adequate benefits for total disability or death due to pneumoconiosis. If no such law was approved by the Secretary of Labor then the claim could be filed with the Secretary (Part C). The Secretary was authorized to process and adjudicate claims and, if appropriate, identify a coal mine employer who was responsible for the payment of benefits to the claimant. If no coal operator could be identified, then the Secretary was authorized to pay benefits from Federal funds.

It was not long before dissatisfaction with the federally funded portion of the program began to occur. During the 1969 hearings a number of physicians urged the Congress to enact a provision which would prohibit the denial of black lung claims solely on the basis of a negative chest x-ray.²⁸ Instead Congress deferred to the Public Health Service and the National Institutes of Health to develop appropriate diagnostic approaches toward the determination of claimant eligibility. Although evidence of the fallibility of the x-ray continued to mount, HEW defended its

²⁸ 1969 Senate Hearings supra. Part 2; 660-663, 693; Part 3; 1028.

view that a negative x-ray was definitive as to the absence of pneumoconiosis.²⁹ Similarly, there was dissatisfaction with the newly incorporated definition of "total disability" adopted by SSA from its Title II disability program which considered an individual totally disabled only upon a showing of the inability to engage in any gainful employment. And still further many miners suffering from respiratory diseases, and other conditions such as Cor Pulmonale which many physicians felt were directly related sequelae or symptomatology of pneumoconiosis simply could not obtain benefits. While the debate over these matters continued among the scientists and social theoreticians,³⁰ Congress was first becoming aware "that the solution [had] not been nearly as complete as Congress believed and expected it would be."³¹ By late 1971 three bills had been introduced to amend the existing law and in December of 1971 extensive Congressional hearings began.³²

29 U.S. Department of Health, Education and Welfare, First Annual Report on Part B of Title IV of the Federal Coal Mine Health and Safety of 1969, p. 18 (1971).

30 See generally, Papers and Proceedings of the National Conference on Medicine and the Federal Coal Mine Health and Safety Act of 1969, (Washington, D.C., June 1970).

31 S. Rept. No. 92-743, 92nd Cong., 2d Sess. 3 (1972).

32 Id.

At many different times it was proclaimed that the 50% claims approval rate of SSA was not enough, and it is probably for that reason that Congress moved to decisive action.³³ The medical support for a modification of the law's eligibility criteria was convincingly presented by many witnesses. The Social Security Administration argued that the cost of the program had already far surpassed expectations. Those who opposed change both in the scientific community and in the government did so primarily on the basis of the argument that it would be improvident to act until all the evidence was in, or until further resolution of the medical and diagnostic controversies could be achieved. Congress was not prepared to ask the afflicted miners, the widows and orphans who had petitioned for change, to wait.

The 1972 amendments, termed the Black Lung Benefits Act of 1972,³⁴ added a number of new provisions to the original Act. The term "total disability" was redefined to permit a miner to receive benefits if his pneumoconiosis prevented him from engaging in his regular coal mine work, regardless of his ability to perform other gainful work.³⁵

³³ Id.

³⁴ Public Law 92-303, approved May 19, 1972.

³⁵ 30 U.S.C. 902(f).

The coverage of the Act was extended to include miners employed in surface mines and to permit the survivors of miners totally disabled at the time of death to receive benefits regardless of the cause of the miner's death. Of critical importance were the medical expansion features of the 1972 Act which included a new rebuttable presumption of total disability due to pneumoconiosis if a miner or survivor could demonstrate the existence of totally disabling respiratory or pulmonary impairment and 15 years of coal mine employment. The presumption can be rebutted only by a showing that the miner does not or did not have pneumoconiosis or that the condition did not arise out of employment in a coal mine.³⁶ A companion provision prohibits the denial of a claim "solely on the basis of the results of a chest roentgenogram" and requires the utilization of all available diagnostic techniques and any other reasonably probative medical or non-medical evidence tending to demonstrate the existence of a totally disabling respiratory or pulmonary disease.³⁷

36 30 U.S. C. 921(e) (4)

37 30 U.S.C. 923(b)

Finally, the amendments extended Federal responsibility for the payment of benefits until December 31, 1973. A new section 415 established a transitional period to facilitate the administrative change over from the Secretary of HEW to the Secretary of Labor. Claims of miners filed between July 1, 1973, and December 31, 1973, were to be adjudicated and paid by the Secretary of Labor. Beginning on January 1, 1974, the responsibility for payment on claims so filed and approved shifted to any coal operator found liable for the payment of such claims. Claims filed subsequent to December 31, 1973 were to be filed under an approved State Workers' Compensation law or if no such law were approved and none has been so approved, with the Secretary of Labor. In any event the liability for such claim was expected to fall on individual coal operators.

Once again Congress had responded to the urgent concerns in the coal fields. The coal operators obtained an 18 month reprieve from liability. The miners and their representative groups received liberalized eligibility criteria and a generally expanded Act. The health profession received a statutory authorization of funds for research.³⁸ The States were awarded more time

³⁸ 30 U.S.C. 937.

to improve their laws and the Federal agencies were admonished to do better which it seemed, at the time, was a fait accompli under the new law.

On July 1, 1973 the Department of Labor began to enforce and administer the letter and spirit of the Black Lung Benefits Act of 1972.

IV. EXPECTATIONS AND REALITY

The diverse groups who appeared joined in support of the amendments soon divided in their expectations and objectives. Since the goals of each of the constituent groups were, and continue to be, incompatible, the evolving program realizes little universality of acceptance.

The Black Lung Benefits Act of 1972 was an attempt to resolve inequities in the earlier legislation and to respond to the plethora of claimant complaints to liberalize and expedite the determinations of eligibility. Although hailing the amendments at first, the United Mine Workers of America in less than a year expressed disenchantment. In testimony in June 1974 the Union predicted proportionally higher claim denials by the Department of Labor than by the Social Security Administration pointing out the differences in the medical

standards utilized by the two agencies.³⁹ While Union officials could not accept them, they identified and understood the reasons for these discrepancies. Thousands of miners and widows soon petitioned Congress and the press to "right the wrongs" arising from the workers' compensation features of the Act which saw widows being denied under a three-year statute of limitations, saw the burden fall to the miner to argue his case before the industry in a new tier of adversary proceedings, and who saw approval rates plunging downward from the highs enjoyed earlier under SSA.

The following table compares approval rates of the two administering agencies.

APPROVAL RATES						
	<u>04-30-71¹</u>	<u>12-31-71¹</u>	<u>12-31-72²</u>	<u>12-31-73²</u>	<u>12-31-74¹</u>	<u>12-31-75¹</u>
SSA	49.0	49.5	49.3	62.1	64.2	N/A
DOL	-	-	-	-	18.7	13.5

¹ Approval rates based on ratio of approvals to claims processed.

² Approval rates based on ratio of approvals to claims filed.

N/A Not available.

³⁹ Testimony of Bedford Bird, Hearings on H.R. 3476, H.R. 8834, H.R. 8835 and H.R. 8838 before the House General Subcommittee on Labor, 93rd Cong. 1st and 2d Sess., 350 (1974) (hereinafter, 1974 House Hearings).

From January 1970 through May of 1972, SSA adjudicated its claims under the permanent criteria outlined in the Federal Coal Mine Health and Safety Act of 1969.

In May 1972 with the passage of the amendments to the Act, SSA began adjudicating claims utilizing the interim medical standards. Included in this process was a review of denials filed prior to the amendments. The true impact of the amendments on SSA's approval rate is not reflected in the Table above in 1972 due to the statistical accounting change explained in the Table and due to administrative adjustments being made by SSA. The first approvals under the amendments were not reported until September of 1972, three months after passage. By December 1973 the impact of the amendments is clearly visible on the approval rate. Most claims had been initially adjudicated and, therefore the computation of the rates had a smaller effect on the results.

DOL does not show an approval rate for 1973 since the program had only been underway for six months. Under the current claim process, the claims are filed at the SSA District Offices and forwarded to DOL in Washington. In 1973 the first claims did not arrive until September which left little time for adjudications to be completed in that year.

Regardless of the reasons for the Department of Labor's lower approval rate, such as a residual population, lower dust levels, stricter medical standards, and high widow denial by statute, the expectations of the claimant group and the potential claimant group were not being met (Appendix A). They had been conditioned to another and distinctly different approach to the adjudication of black lung claims.

The coal industry had other expectations; coal operators warned of high premium rates, bankruptcy, increased coal costs and inordinately high medical treatment costs tied to a large liability generated by a high level of approvals.

When the National Council on Compensation Insurance, the major compensation insurance rate making body, began negotiations with its subscribing carriers many of those carriers discussed an initial insurance rate of \$100 per \$100 payroll. One insurance executive likened the rate making proceedings to those which occurred when rates were being determined for catastrophe insurance in the nuclear power industry. In a letter accompanying a study of the black lung situation in Kentucky sponsored in part by the Kentucky Department of Labor it is stated -

Sky rocketing insurance rates threaten the basic profitability and viability of coal mining and of coal's position as Kentucky's #1 industrial tax source and America's most abundant answer to the current energy crisis.⁴⁰

In a study, J. Huell Briscoe and Associates of Chicago estimated an annual coal industry liability of \$237,834,225 for claims of active miners alone. An additional \$2 billion plus liability was estimated to pay medical benefits only to miners already receiving benefits under the Social Security part of the program.⁴¹

The National Coal Association predicted that the tremendous cost impact of black lung would drive many marginal operators from the industry.⁴²

The American Mutual Insurance Alliance in April 1974 charged that the "unscientific" (medical) criteria that had been incorporated into the original 1969 Act and in the liberalization of those criteria in the 1972 amendments was "grossly inappropriate." It transformed Title

40 Public Systems, Inc., Black Lung; An Analysis of the Social & Economic Impact of Compensation in Kentucky for Coal Miner's Pneumoconiosis, 1, April 16, 1973.

41 Affidavit of J. Huell Briscoe submitted to the United States District Court for the Eastern District of Kentucky at Pikeville in Turner Elkhorn Mining Co., et al v. Brennan, supra.

42 Testimony of Carl E. Bagge, 1974 House Hearings supra. 281-284.

IV into a "pension program for coal miners without regard to whether the miner is in fact disabled or whether the disability, if any, resulted from occupational exposure."⁴³

As late as March 1975 a coal industry spokesman quoted HEW testimony that the cost of the program originally estimated at \$3 billion over 20 years, will in fact be almost \$20 billion and concluded that any future estimate will be far too conservative. The industry in this same testimony noted actuarial studies that placed potential liability for medical expenses at \$12,000 to \$20,000 per award under the Department of Labor's program.⁴⁴

After further extensive negotiations and actuarial studies the insurance industry estimated premium costs for the combined State and Federal programs for occupational diseases arising out of underground coal mine employment to approximate \$25 per \$100 payroll.⁴⁵

⁴³ Testimony of Andre Maisonnier, 1974 House Hearings supra. 295.

⁴⁴ Testimony of Carl E. Bagge for National Coal Association before the Subcommittee on Labor Standards, House Committee on Education and Labor, March 13, 1975.

⁴⁵ Testimony of Carl E. Bagge, 1974 House Hearings supra. 283.

While premium rates generally reflect only the combined exposure under State and Federal laws, a review of premium rates in Pennsylvania in which the Federal increment may be segregated shows that the Federal risk represents approximately 20% of the total occupational diseases premium.⁴⁶

The following table shows change in premium rates since the program's inception.

Occupational Diseases Premium Rates by Major Coal States -
Underground Exposure

States	Initial - 7-1-73	New Rate	\$Increase/Decrease	Effective Date
AL	\$25.49	No Change		
CO	17.33	No Change		
IL	26.47	No Change		
IN	26.16	No Change		
KY	None	No Change		
OH*	6.30	No Change		
PA*	3.61	\$7.63	+ \$4.02	7-1-75
TN	25.41	No Change		
UT	28.60	No Change		
VA	23.89	No Change		
WV*	\$ 7.15	\$4.00	- \$3.15	7-1-75

* Federal risk only.

⁴⁶ Coal Mine Compensation Rating Bureau of Pennsylvania Occupational Disease Rate Filing for Fiscal Year, July 1, 1975 to June 30, 1976.

While the private insurance carrier rates have not changed materially since the inception of Part C, the State of West Virginia, which operates an exclusive State fund, reduced rates applicable to the Federal risk by 44% and 58% respectively for underground and surface mine exposure.

As additional claims experience is developed, it is anticipated that State regulatory agencies will adjust private carrier rates accordingly. At present 53 private carriers and four State funds are insuring Federal black lung obligations on behalf of 3,064 coal operators.

At least one major insurer of workers' compensation liability has reported significantly increased earnings and premium volume since passage of the Federal Act.⁴⁷ Since the amount of premium assessed by an insurer is not determined by the claims experience of the individual coal operator, premiums collected in excess of liability are not returned to the coal operator.

The Department of Labor, reflecting a lower than projected rate of approvals, is reducing, as appropriate, the amount

⁴⁷ Alan Abelson, "Up and Down Wallstreet," Barron's, June 16, 1975.

of securities or indemnity bond necessary to secure obligations of the 61 coal operators presently qualified as self-insurers.

At the time of this report there is no available evidence that the provisions of Title IV have contributed materially to the failure of large numbers of marginal coal companies.

While the cost of coal has risen considerably since December 1973, economic factors other than occupational disease liability entered during this period. Certainly the energy crisis, inflation, increased profit margin, labor costs and the strong export demand were variables of predominant impact.

DOL's treatment costs under Part C are in sharp contract, to industry predictions. Assuming that there is an overlap in treatment payments with other programs such as Medicare and adding an overlap factor, DOL's experience to date is \$325 per patient year. Using a survival rate of 7.5 years post entitlement, a lifetime medical treatment cost per beneficiary is estimated at \$3,740. Fewer than 10 percent of those enrolled in the treatment program submit bills in any given month. If diagnostic costs are added there is an average one-time cost of \$125 per claimant.

Total benefit costs of the Department are as follows:

DOL Black Lung Costs, FY 1974-1975

	<u>FY 1974</u>	<u>FY 1975</u>
Special Benefits	\$1,606,200	\$7,171,500

The above table reflects total Federal costs. Since DOL initiates interim payments to claims in protracted litigation, 30% to 50% of the above will be assessed against the industry.

The expectations of the medical/scientific sector were reflected from the research both here in the United States and abroad (Appendix B). 'Since intensive research efforts into the causes and character of black lung disease started little more than 10 years ago in the U.S., there is a paucity of material. The authors will not attempt to analyze the varying scientific opinions as to the adequacy of diagnostic criteria nor explore causality issues. These topics are discussed elsewhere in this Conference.

Since base-line data were not, and still are not, available on coal mine employment the Department's expectations were not in all respects valid. Planning staffs had first

estimated a base of 40,000 new claims for the first fiscal year of operation and an additional 20,000 refilings of miners approved by SSA but seeking medical treatment benefits under the new Part C.

The base number of new filings projected could not have been more accurate. In FY '74 the Department received 39,910 new claims. The number of refilings, however, had been miscalculated with only 1,552 refilings in FY '74 and only 3,369 cumulative through October 1975. The reasons for this reluctance on the part of miners to file for medical benefits are now quite obvious:

- o The older miner is covered by Medicare or other health plans and the symptoms of black lung are often compatible with those of old age.
- o A miner does not wish to risk becoming involved in an adversary proceeding with his former employer for medical treatment only.
- o There is an aversion on the part of a miner already receiving SSA benefits to "open up" his case with another agency even though DOL and SSA have assured that only if fraud is discovered would there be any chance of loss of present benefits.

Higher approval rates had been anticipated primarily because the impact of not being able to utilize SSA's interim medical standards had not been fully estimated. The Department's

planners also assumed that miners' widows were aware of the approaching new three-year statute of limitations having been informed through a strong public information effort by SSA in the spring and fall of 1973.

A combination of a lower number of total filings, a lower approval rate, and a higher Federal outlay during protracted litigation necessitated readjustments in DOL cost projections from those originally expected.

V. MECHANISMS FOR FACILITATING DETERMINATION

A. Burden of Proof

Under most compensation laws the burden of proving entitlement is on the claimant.⁴⁸ It is only through the use of presumptions and/or definitions, that the burden may be shifted to the employer. Within the black lung context the claimant may make use not only of the specific statutory presumptions contained within the Act, but may also utilize a general presumption of entitlement contained in section 20 of the Longshoremen's Act. That presumption has been construed by the Courts to permit a finding of entitlement based solely on the occurrence of an unexplained injury or death.⁴⁹

48 3A. Larson, supra. § 80.33.

49 Wheatley v. Adler, 407 Fed 307, (D.C. Cir., 1968).

These presumptions, taken as a whole, are particularly important to that majority of claimants who are unable to obtain definitive medical proof of entitlement. Without the presumptions, the widely divergent views held within the medical profession would operate to the detriment of many claimants and would undoubtedly result in the denial of valid claims. By shifting the burden to the employer Congress has largely made the individual coal operator responsible for the financial consequences ensuing to the claimant as a result of physicians' inability to reach a consensus in the area of coal dust related respiratory diseases. While research data might have supported a different approach, Congress made the socioeconomic judgment that the cost of uncertainty was to fall upon coal operators rather than disabled miners and the survivors of deceased miners.

For similar reasons, and in accord with recently evolving principles of workers' compensation law, conflicts in the evidence are required to be resolved by the adjudicator in favor of the claimant. So, for

example, if a claimant presents clear evidence demonstrating total disability due to complicated pneumoconiosis and an employer submits the report of five different and equally qualified physicians tending to show that the claimant is perfectly healthy, the adjudicator, all other things being equal, may be required to resolve this conflict in favor of the claimant. The conflict resolving principle becomes particularly important in the case of a claimant with no x-ray evidence of pneumoconiosis who is suffering from chronic bronchitis, emphysema, or the like. In this case the statement of a single physician to the effect that the claimant's conditions are related to coal dust retention in the lungs may be of particular significance. In order to overcome the claimant's case for entitlement, the coal operator must present convincing evidence that the miner's impairment is or was completely unrelated to his employment in the mines.

This approach is, once again, incorporated into the law to insulate the claimant from the defeating effects of etiological uncertainties.

B. The Legal Framework for Entitlement

In order to establish entitlement to benefits a miner must prove (1) that he is suffering from pneumoconiosis; (2) that his pneumoconiosis arose out of coal mine employment; and, (3) that he is totally disabled by pneumoconiosis. The survivor of a miner must prove that the deceased miner was totally disabled by pneumoconiosis at the time of his death or that the miner died due to pneumoconiosis.

The problems of proof which initially confront the claimant are almost completely circumscribed by a maze of presumptions, evaluatory criteria, tables, regulations, and standards. In no other instance has a compensable condition been so minutely defined. The result is, of course, a "legal" disease which is, perhaps, unfamiliar to the medical profession.

For example, pneumoconiosis itself is a fairly distinct clinical entity which is generally defined in terms of x-ray findings. A claimant who submits x-ray proof of pneumoconiosis has done all he needs to do to meet that element of eligibility. But recall, the law prohibits the denial of a claim solely on the basis of a negative x-ray. The claimant

without x-ray evidence may therefore establish the existence of the disease by utilizing the 15 year presumption of pneumoconiosis upon the showing of a respiratory or pulmonary impairment or the claimant may demonstrate the existence of the disease by establishing the presence of a recognized sequelae condition,⁵⁰ or by showing a symptomatology consistent with pneumoconiosis combined with a history of coal mine employment, or the claimant may prove pneumoconiosis by the presentation of a medical report attributing any respiratory or pulmonary disease to employment in a coal mine.⁵¹ In the case of a survivor of a miner pneumoconiosis may be proven simply by the presentation of lay testimony to the effect that the miner during his lifetime suffered⁵² from a chronic respiratory or pulmonary impairment.

The fact of causal relationship between the disease and coal mine employment is normally no difficult matter for the black lung claimant. The 10 year presumptions of causal relatedness serve most claimants in this regard. In order to prove what is ostensibly a medical fact, most claimants need only

50 Subpart D, 20 CFR Part 410, Appendix.

51 20 CFR § 410.414.

52 30 U.S.C. 921(c)(4), 923(b).

prove 10 years of coal mine employment. The claimant who cannot demonstrate 10 years of employment must provide medical evidence of causal relationship.

There are, however, significant problems posed by the use of a years-of-employment presumption. While employment periods are sometimes difficult to document due to the destruction of records and the fading of memories, the claimant's own testimony may be sufficient. Social Security Administration earnings records are helpful in this regard but too often these records are incomplete and only date back to 1937. Many of the present claimants under the Department of Labor's program must rely upon employment prior to 1937.

Once having demonstrated the existence of pneumoconiosis and its employment relationship, the focus of a claims investigation turns to the question of total disability or death due to pneumoconiosis. The concept of total disability embodied in the Federal law is primarily economic and social rather than medical. Thus the determination of the extent

of a miner's disability is taken away from the physician and entrusted to the adjudicator.⁵³

Total disability within the context of the Federal law does not mean the physical incapacity to do all work. That term is defined by statute and regulation to mean:

The inability to engage in gainful work in the immediate area of his [the miner's] residence requiring the skills and abilities comparable to those of any work in a mine or mines in which he previously engaged with some regularity and over a substantial period of time.⁵⁴

In enacting this provision Congress sought to address the "realistic" employment potential of an afflicted miner who could or should not obtain work in the mines.⁵⁵ Pursuant to regulations, mandated by the Congress, even if the impairment alone does not result in this inability to engage in comparable and gainful work, consideration of the miner's age, education, and work experience⁵⁶ may justify a finding of total disability. The miner who is suffering from complicated pneumoconiosis is automatically entitled to benefits regardless of his ability to work. On the other hand, a miner who is working

53 20 CFR § 410.471

54 20 CFR § 410.412

55 2 U.S. Code Cong. Adm. News 2320-21 (1972) 117 Cong. Rec. 4043 (1971).

56 20 CFR § 410.426

at his regular coal mine employment and is not suffering from complicated pneumoconiosis cannot be found totally disabled. A miner working outside the mines may be found totally disabled, regardless of his income, if he is incapable because of his respiratory disease from performing the work he did while in the mines.

The primary tests utilized to determine total disability (they may also be used to prove pneumoconiosis) are ventilatory function studies and blood gas tests. The testimony of a claimant as to the effect of his respiratory impairment on his ability to work, if supported by a rationalized medical report, may be sufficient proof of total disability to trigger a finding of entitlement. The formal adjudicator is afforded wide discretion to either believe or disbelieve the evidence placed before him.

The medical entitlement picture which emerges from this framework is of grave concern to the coal industry. The presumptions are difficult, if not impossible in many cases, to rebut. It is alleged that coal operators will be required to pay benefits to individuals who are disabled by age or the diseases

of aging, or to individuals who are not disabled at all but who have simply chosen to pursue other work or who do not wish to work in the mines.⁵⁷

There is, of course, some truth to what the coal operators say and that industry's opposition to the "deep pocket" theory it perceives embodied in the law is understandable. Congress perceived the equities differently. It did not think it proper for medical uncertainties to redound to the disadvantage of the coal miners. And although some few invalid claims might be approved under the Act that was a far better state of affairs than one in which many valid claims would go uncompensated for lack of definitive medical conclusions. Congress chose a workers' compensation program as a means to carry forth this intent. The appropriateness of this choice will remain a matter for debate.

Many physicians who have contact with the formal adjudication process are similarly concerned. A physician testifying against a claim is routinely subjected to a thorough cross-examination.

⁵⁷ Memorandum of Law in Support of Plaintiff's Motion For Summary Judgment, Turner Elkhorn Mining Co. et al v. Brennan, 385 F. Supp. 424 (E.D. Ky., 1974)

concerning his philosophical disposition toward pneumoconiosis. The commonly heard statement that "simple pneumoconiosis can never be disabling" is, for example, often sufficient to impeach that doctor's credibility. Neither the coal industry nor the physicians they employ to examine claimants have yet accepted the fact that the primary role of the physician in the claims adjudication process is to read x-rays, ventilatory tests, blood gas tests and report the results. Thus, the physician's viewpoint may be accorded little weight by the adjudicator in formal hearings, especially if it is contrary to the weight of the claimant's evidence. It is only because the regulations are not as precise as many would like, that the "subjective" evaluation by a physician is of significance.

C. The Statute of Limitations

Every workers' compensation law has a statute of limitations (California failed in an attempt to repeal their's in 1974) and Part C of the Federal program is no exception. That limitation provision provides that claims of miners must be filed within three years from the discovery of total disability due

to pneumoconiosis, and in the case of a survivor's claim, within three years from the miner's death.⁵⁸ While this limitation period takes into account the latent and sometimes progressive nature of black lung it poses difficult problems for claimants and coal operators alike. The operators point out that the statute is essentially meaningless since pneumoconiosis and total disability therefrom, as defined in the Federal law, could not possibly have been "discovered" until Congress created those concepts on December 30, 1969, the effective date of the original Act. The statute of limitations cannot protect the operators from "pre-enactment" claims. There is some truth to the operator's position in this regard, although on several occasions adjudicators have barred claims based upon their judgment that the miner actually discovered that he could no longer work in the mines due to pneumoconiosis prior to the Act. The claimant population, and especially miners' widows, who must file within three years of the miner's death are perplexed and angered when they find their claims barred for a reason which

⁵⁸ 30 U.S.C. 932(f)(1); see also 20 CFR § 725.124

they are unable to understand. The SSA program contained no time limitation for the filing of claims. Almost 40% of the claims forwarded for formal litigation involve time barred widows' cases and about 75% of all cases at that level involve the statute of limitations.

D. The Medical Criteria

Medical considerations alone can justify a finding that a miner is (or was) totally disabled if his impairment due to pneumoconiosis meets the coal mine employment tests noted earlier and if a finding of the existence of complicated pneumoconiosis may be made from an x-ray of suitable quality. However, where only simple pneumoconiosis is shown additional medical evidence may be necessary to establish entitlement.

The most frequently used additional evidence are the Ventilatory Test Values. A respiratory impairment may be demonstrated on the basis of a ventilatory

study in which the maximum voluntary ventilation (MVV) or maximum breathing capacity (MBC) and one-second forced expiratory volume (FEV₁) are equal to or less than values specified by height of the claimant. It is required that the spirometric tests be expressed in liters per minute and that the reported maximum effort should represent the largest of at least three attempts.

In the absence of evidence rebutting such findings, a miner who meets x-ray or ventilatory study standards or one of the following set of medical specifications may be found totally disabled:

- o Arterial oxygen tension or oxygen saturation at exercise or rest (when exercise is medically contraindicated).
- o Cor pulmonale with right-sided congestive failure.
- o Congestive heart failure with signs of vascular congestion.
- o Other relevant evidence, e.g., clinical examinations, medical histories and spouses' affidavits in conjunction with other medical evidence.

In order to develop a program for medical diagnosis of the tens of thousands of claimants expected in the first year of operation, the Department utilized

SSA lists of medical providers and built upon that base through contacts with State and national medical associations, recommendations and invitations to participate. By the end of the first fiscal year 1,500 medical providers were under contract growing to over 2,000 after two years (Appendix C). Shortly after inception analysts on DOL's medical staff began to note wide disparities in the quality of evidence being submitted. About 25% of the x-rays were of such poor quality that adequate readings for pneumoconiosis could not be obtained from the under- or over-exposed films. Additionally, physicians were either not running three attempts or were not forwarding the required tracings of the ventilatory tests, and clinical examination reports were vague and inconclusive.

Perhaps the fault lay with the Department. Accordingly instructional materials were revised, more explicit forms were designed, and certain providers were reminded of their commitments. In cases where poor performance was habitual termination of the contractual agreement was recommended. The x-ray quality problem continued and in consultation with the Standards Committee of the American College of

Radiology, in cooperation with NIOSH, a quality control program was established. Results have been positive with a decrease to less than 10% of unreadable film at present.

The diversity of the sophisticated hardware used in diagnosis poses an additional problem of standardization and equity. The Federal Government can assert regulatory control, however given the economic implications such an approach is not feasible.

The administrative problem of quality of evidence is noted in detail because in workers' compensation for occupational disease the degree to which evidence is questionable must be reduced to a minimum. The questions of causality and liability are of such magnitude that the quality of medical evidence should not be a variable.

In addition there exists, in many sectors, a constant concern that the medical standards themselves need review and revision. Authority to develop medical standards and promulgate regulations under the Act was conferred to the Secretary of HEW. To process the large backlog of black lung claims that had to

be readjudicated under the provisions of the 1972 amendments and in recognition of limited medical resources and techniques, the Senate Committee Report directed the Secretary of HEW "to adopt such interim evidentiary rules and disability evaluation criteria as will permit prompt and vigorous processing of the large backlog of claims consistent with the language and intent of these amendments."⁵⁹

The interim criteria were formulated and published as part of the revision of the regulations required to implement the 1972 amendments. The ventilatory tables or standards in the regulations applicable to Department of Labor adjudications are more restrictive than those applicable to claims filed under the Social Security Administration's Part B Black Lung Program. As noted earlier these dual standards have evoked considerable public concern.

The question of accommodation for claimants at altitudes of 1,500 meters or higher has also been raised. Physicians suggesting revision of the

59 S. Report No. 92-743 supra. 18.

criteria state that at high altitudes "The spirometrics were found to be almost totally worthless in evaluating disability or making a diagnosis of pneumoconiosis. Almost all of the miners had normal vital capacities."⁶⁰ Dr. Keith Morgan noted that he and his colleagues in investigating the range of pulmonary function abnormalities that may occur in coal mines found "in other parts of the U.S. namely, Utah and Colorado, coal miners have a ventilatory capacity better than expected."⁶¹

The United Mine Workers of America in discussing the interpretation of the ventilatory tests stated that "Part of the (latter) problem might be obliterated by Congress specifying use of the ILO respiratory values which we urged SSA to accept shortly after enactment of P.L. 92-303."⁶² Dr. Lorin Kerr had earlier pointed out disparities between the Kory-AMA values, on which the present standards are

60 Harvey Phelps, "Observations on High Altitude Coal Miners," Rocky Mountain Medical Journal, 69; 59-63, (1972).

61 Testimony of W. K. C. Morgan before the Subcommittee on Labor Standards, House Committee on Education and Labor, February 27, 1975.

62 Testimony of Lorin E. Kerr, 1974 House Hearings supra. 134.

based, and the ILO values, noting that a major disparity was the selection of subjects for the validation of the respective studies with the European figures referring to heavy laborers particularly miners, and the U.S. to "hospital employees, patients, medical students, residents and full-time physicians."⁶³

E. Staff Resources

No discussion of the administration of a workers' compensation program would be complete without a review of the ratio of workers to workload.

Compensation claims processing productivity, a basis for staff allocations, is traditionally measured by the time required to process a claim to determination. However, comparisons between processing traumatic injury claims and occupational disease claims are not valid. As this paper has indicated the complexity of the diagnostic procedures and criteria, the diversity of medical opinions, the questions of causality, and the resulting need for explicit and quality evidence

63 Lorin E. Kerr, Letter to Robert M. Ball, Commissioner of Social Security Administration, D/HEW, September 14, 1972.

protract the processing time interminably. Occupational disease staffing patterns should reflect these time factors. Individual workloads should not exceed levels which impede timely decision-making.

The Department's present experience is a median caseload of 1,200 claims per examiner. While some cases, where adequate evidence is readily available, can be processed in a few months, an average claim is taking approximately one year to determination. This waiting period the public finds difficult to understand and accept.

VI. The Medical Benefits Program

The general philosophy employed by the Department in establishing its black lung medical treatment program is that while there is no way of reversing CWP, important efforts can be made to maintain the pulmonary effectiveness of miners at acceptable levels. The objective of this approach is to improve the quality of life of the afflicted miner to the greatest extent possible, and by preventive care avoid the expense and devastation of an acute respiratory crisis. This approach is based largely on the extensive works of

Doctor Professor W. T. Ulmer of the Federal Republic of Germany, an acknowledged expert in the treatment and care of coal miners afflicted with black lung. This approach has been successfully implemented in West Germany.

More specifically, such treatment modalities as oxygen, care of common upper respiratory infection, antibiotics, and the like are provided because they reduce the effect of various unrelated respiratory conditions on the miner's already reduced pulmonary functions. The failure to provide such treatment to an afflicted miner, even though such failure may be of minor medical consequence in the case of a person with normal respiratory capability, could result in respiratory crises and probable death of the miner. Chronic conditions such as bronchitis and emphysema, both of which are components accompanying black lung⁶⁴ are treated for similar reasons. Chronic conditions such as emphysema and chronic bronchitis are an integral part of the coal workers' pneumoconiosis syndrome, particularly in the advanced stages of CWP.

Treatment for certain types of heart disease in addition to right side hypertrophy and cor pulmonale, both of which conditions are specifically intended by Congress

64 S. Report No. 92-743, supra. 10-11.

to be covered, is required in the applicable medical regulations and is recommended by our physicians on the grounds that the back up of fluid into the lung fields (edema) caused by heart disease is a substantial burden on an already compromised lung. Although we can not say that lung cancer is related to coal dust, it is the opinion of medicine that the presence of cancer in the lung is a further insult to an already impaired lung. The current medical knowledge which does not directly tie lung cancer to coal dust accumulations does not prevent the Department from providing treatment to the miner for this condition.

As noted earlier in the discussion of expectations and projections, the number of persons seeking treatment benefits is small. DOL has recently co-sponsored, with the American College of Chest Physicians and NIOSH, an educational symposium to exchange information among physicians treating and counseling coal miners with cardiorespiratory diseases.

Report forms have been issued to treating physicians across the Country and hopefully the compilation of data on the nature and frequency of treatment should begin within the year.

As the number of beneficiaries increases the administrative problem of monitoring treatment and processing reimbursements grows. While DOL has the staff resources to meet the present workload, the need for a third party payor is approaching. Explorations have begun into possible agency and organizational linkages and the emerging cost benefit issues of such an approach are of critical concern.

VII. THE LITIGATION

Early in the spring of 1973 the Department of Labor's planning staff mailed informational material on the new Act to over 5,000 coal operators. On May 11, 1973 regulations governing the operators' statutory obligation to insure the payment of benefits by either purchasing commercial insurance, qualifying as a self insurer, or obtaining coverage from a State insurance fund, were published in the Federal Register.⁶⁵ Later on in May 1973 the Bituminous Coal Operator's Association sponsored a conference in Washington at which Department of Labor representatives outlined the nature and scope of the Federal black lung program to over 200 representatives of the coal and insurance industries. Shortly thereafter

⁶⁵ 20 CFR Part 726.

the coal operators formed a lawyers committee to challenge the implementation and enforcement of the coal operator liability provisions of the Act, and the application of the Act's medical criteria to claims involving the liability of individual coal operators.

Coal industry resistance to liability began on two fronts. In August and September of 1973 two lawsuits, one in Kentucky and the other in the District of Columbia, were brought by the coal industry against the Secretary of Labor. The two suits were essentially identical in that they challenged -

- o The constitutionality of requiring coal operators to pay benefits to individuals last employed with such operators prior to the Act's effective date;
- o The constitutionality of the presumptions' and other medical eligibility criteria insofar as those standards would in certain cases require operators to pay benefits to individuals who were not totally disabled or who were not so disabled as a result of coal dust exposure;
- o The regulatory authority of the Secretary to assess liability against a disabled or deceased miner's last employer in the coal industry; and,

- o The authority of the Secretary to require coal operators to pay medical benefits only to claimants who had previously qualified for benefits under the Social Security portion of the program, which provided no medical benefits, and who could also qualify for benefits under the Department of Labor's program which did provide medical benefits to eligible claimants.

The operators argued that the law was suspect by virtue of the fact that pre-enactment employment could be utilized as a basis for the assessment of liability, that the eligibility criteria were overbroad, and that the presumptions were not reasonably rebuttable. This framework, in the operators' view, constituted a deprivation of property without due process of law which is prohibited by the Fifth Amendment.

The District of Columbia Court in February 1974 issued an opinion rejecting each of the industry's arguments. The U.S. Supreme Court summarily affirmed later in that year. The Kentucky Court was somewhat more receptive to the operators' arguments and although that Court made no findings contrary to the Supreme Court's affirmance, it did discern two provisions in the law which were not specifically argued by the parties, which the Court felt were unconstitutional. Those two provisions were

the irrebuttable presumption of entitlement based on a finding of complicated pneumoconiosis and the limitations on the rebuttal of the 15 year presumption.⁶⁶ The Supreme Court lifted the injunction entered by the Kentucky Court and undertook to examine the merits of the contentions of the parties in greater detail. On December 2, 1975 the U.S. Supreme Court heard the arguments of the parties and its decision is pending.

The second line of defense was established in the claims adjudication process. Pursuant to the incorporation by the Black Lung Act of sections 19 and 21 of the Longshoremen's Act, the formal adjudication of claims takes place at three levels. If a claim cannot be amicably resolved at the administrative level it is forwarded to DOL's Office of Administrative Law Judges for a formal hearing to be conducted in accordance with the Administrative Procedure Act. Thereafter an aggrieved party may appeal to the statutorily created Benefits Review Board. Decisions of the Board are considered to be nationwide precedent unless reversed by a Federal Circuit Court of Appeals. Appeals from Board decisions may be taken directly to the United Circuit Court of Appeals.

⁶⁶ 385 F. Supp. 424 (November 20, 1974).

Approximately 97% of all claims determined by the Department involving a question of operator liability are referred for formal proceedings, by a coal operator's controversion of such liability. In the August 1974 issue of Coal Age magazine the attorney for the National Independent Coal Operator's Association urged all operators to resist the payment of claims pending the Supreme Court's resolution of the constitutional issues raised. Many operators took that advice. Some operators who have become dissatisfied with the statutory claims determination process have gone into Federal district courts to seek relief - in most instances to no avail. Almost 90% of all cases decided against operators at the first level of adjudication have been appealed. And of those few who have not appealed even fewer are being paid by the operator determined liable, thus necessitating Federal enforcement action in the courts. No such cases have yet reached the United States Circuit Court of Appeals - proceedings for which protracted litigation is anticipated. The Department of Labor has undertaken to pay interim benefits to claimants determined eligible therefor during the sometimes lengthy formal adjudication of an operator's liability. Both the Act and the implementing

regulations contain special provisions to prohibit operators from avoiding liability through sham corporate transactions.⁶⁷

In any event it is anticipated that increased familiarity with the program and a favorable decision by the Supreme Court will, in the future, lead to decreased claims litigation.

VIII. THE LEGISLATIVE THRUSTS

As dissatisfaction with various aspects of the black lung program under the 1972 amendments began to mount a plethora of legislative proposals were introduced in the House and Senate subcommittees.

In late 1973 Congressman Perkins introduced a bill, H.R. 3476, to extend for two years the period of full Federal liability for claims. A number of industry representatives testified in favor of the extension which, however, was never voted out of the subcommittee. The two-year extension proposal was eventually dropped as far more urgent and dramatic legislative thrusts in the black lung area began to develop.

⁶⁷ 30 U.S.C. 932(i); 20 CFR Parts 725, 726.

Once again it seemed that too few claims were being approved and new complaints came to light in connection with the Part C operator liability program, perhaps foremost among which were (1) that the cost of benefits was not being fully passed onto the coal industry and (2) that the adversary proceedings established for the adjudication of claims was proving too difficult a course for many claimants to pursue. In fact, only 11% of those claimants whose claims are denied at the informal level of adjudication request formal hearings. Many claims are abandoned by virtue of the claimant's apparent decision to proceed no further, after being advised of his or her rights. Claimants most often do not pursue the rights provided to them under the Act.

Some claimants refuse to submit to a coal operator's scheduled medical examinations and complaints of abuse of claimants by "company doctors" are alleged. A large number of claimants do not obtain adequate legal representation. As the coal operators' attorneys have become more sophisticated in the defense of claims, the need for a claimant to obtain an attorney is becoming more acute.

In his February 26, 1975 testimony before the House Subcommittee on Labor Standards, President Arnold Miller or the UMWA stated -

[T]he adversary procedure created by the present Part C (Labor Department) program is simply not a viable mechanism for delivery of a just compensation program to the victims of black lung disease.⁶⁸

The legislative response to these complaints was relatively swift.⁶⁹ In H.R. 8, it was proposed to completely overhaul the existing black lung program. Paramount among the many changes proposed by the bill were:

- o To enact automatic eligibility provisions in the case of miners with 30 years of employment in underground mines or 25 years of employment in anthracite mines; and,
- o To establish an industry financed black lung disability trust fund for the payment of all claims, thereby eliminating the individual coal operator from the claims procedure. The fund would be financed by a severance tax on tonnage of coal mined.

Prior proposed bills attempted to institute a 15-year automatic eligibility provision, and numerous variations

⁶⁸ Testimony of Arnold Miller. Hearings on H.R. 7, H.R. 8, H.R. 1340, and H.R. 3333 before the House Subcommittee on Labor Standards, 4, (1975).

⁶⁹ See H.R. 7, H.R. 8, H.R. 3333; H.R. 17178 94th Cong. 1st Session; H.R. 8 94th Cong. 2d Session.

on the trust fund concept. H.R. 8 contained a number of other provisions which, in part, reopened the federally financed benefits program, and addressed the claimant's effort in the pursuit of benefits. Included among the many other post 1972 legislative proposals are provisions which would extend the coverage of the Act to coke oven workers, iron mine workers, all respiratory disease victims, and all occupational disease victims. The culmination of this activity is the current H.R. 10760 which will be taken up by the House of Representatives this winter or spring.

IX. CONCLUSION

Despite the lack of general satisfaction with the Federal black lung program it is clear that it has been successful as an instrument to provide compensation to victims of black lung who over the years have been unable to obtain such redress.

Although a genuine effort has been made through amendment and regulation to make the Act fulfill the expectations of those affected groups, it appears that in certain respects those expectations can never be met through the mechanisms of a workers' compensation program.

It is extremely difficult to design a governmental program which can provide an absolute "right" to a given class of individuals at the sole expense of another limited class regardless of the existence of a rational nexus between the right and the liability. Nor would such a program seem particularly equitable. What is needed perhaps, and not just from the standpoint of the Federal Black Lung Act, is a re-evaluation of objectives and in light of that re-evaluation, a re-assertion of perspective.

December 31, 1975

DIVISION OF COAL MINE WORKERS' COMPENSATION
Status For Black Lung Claims in The United States

The Department of Labor's (DOL) Division of Coal Mine Workers' Compensation has received reports that 83,800 claims for Black Lung Benefits have been filed in the field offices of the Social Security Administration (SSA) and of this number 79,116 are in process in DOL, Washington, D. C. There have been to date 2,251 cases awarded benefits. The remaining claims in process are pending decisions as follows:

- o 2,143 are potential allowances.

Claims which indicate an acceptable level of disability but which are lacking necessary data from the field to commence payments.

- o 4,375 claims are pending non-medical evidence.

e.g., evidence of coal mine employment marriage certificates, birth certificates, etc.

- o 4,528 are pending a decision from SSA on a prior claim.

- o 28,192 are informal denials.

An informal denial indicates that the evidence presently contained in the claimant file does not support entitlement. It is not a final decision in that the claimant is provided additional opportunities to supply new evidence in support of his claim. Several of these informal denials were issued to widows who did not file within three years of their husband's deaths and therefore are ineligible for benefits under the three-year statute of limitations.

- o The remaining 37,627 claims are pending medical evidence.

In these cases either the medical examination was not scheduled by the Social Security Administration, the appointment was not kept by the miner, the medical evidence was not received by the Department of Labor, or the evidence was received but was of such poor quality a new examination had to be scheduled to protect the miner. In some cases the medical evidence was insufficient to make a determination and the miner was sent for further examinations.

Prevalence of CWP and Pulmonary Function Impairment

The study "Pneumoconiosis in Appalachian Bituminous Coal Miners" examined 2,549 working miners and 1,191 non-working miners between January, 1963 and January 1965. 1/ The accompanying tables show that over one-fourth of working miners and one-half of non-working miners, in the two West Virginia communities studied, showed impairment of ventilatory function below 70% of predicted values. Roentgenographic evidence of CWP was found in only 10 percent of working miners and 18 percent of non-working miners.

Another study of over 9,000 coal miners in ten states between 1969 and 1971 2/ indicated that in miners with simple coal workers' pneumoconiosis little relationship existed between ventilatory capacity and radiographic category. However, complicated pneumoconiosis led to definite ventilatory impairment. The study concluded that with the exception of anthracite miners "ventilatory impairment is minor or minimal" and "time spent underground has a slight effect on ventilatory capacity only in certain regions but overall appears to be inconsequential". This report published in October 1973 compares with DOL findings of ventilatory impairment for only 10% of claimants but is different from the higher impairment shown in the Appalachian study mentioned above.

It has been hypothesized that the prevalence of respiratory symptoms in a geographic area is related to the rank of coal ~~mined~~ just as was found for prevalence of CWP. 3/ This could explain variations in findings of CWP and respiratory function impairment based on geographic areas studied.

1/ Pneumoconiosis in App. Bit. Coal Miners, Lainhart et al, U. S. D/HEW 1969

2/ Ventilatory Capacity and lung volumes of U. S. Coal Miners, Arch. Environmental Health/Vol. 28, April 1974

3/ The Prevalence of Coal Workers' Pneumoconiosis, W. K. C. Morgan, American Review of Respiratory Disease, Volume 98, 1968

APPENDIX B

X-Ray Evidence of Coal Workers' Pneumoconiosis
and Pulmonary Function Impairment 1/

Two Appalachian Communities		
	<u>Non-Working Miners</u> (Percent)	<u>Working Miners</u> (Percent)
Roentgenographic Findings		
None or less than simple	81.8	90.2
Simple	9.2	6.8
Complicated	9.0	3.0
Ventilatory Functions		
Normal	50.0	72.0
Impaired	50.0	28.0

1/ Pneumoconiosis in Appalachian Bituminous Coal Miners, Lainhart, Doyle, etc., U. S.
Department of HEW, Cincinnati, Ohio 1969

X-Ray Evidence of Coal Workers' Pneumoconiosis
and
Pulmonary Function Impairment
in Department of Labor Black Lung Claimants 1/

	TOTAL	Allowances (Percent)	Denials
Roentgenographic Findings			
None or less than Simple	82.5	32.4	76.2
Simple	14.7	45.1	23.8
Complicated	2.8	22.5	.0
Ventilatory Function			
Normal	89.5	38.4	95.9
Impaired	10.5	61.6	4.1

1/ DOL initial denials and beneficiaries enrolled in treatment through November 1975.

December 1975

Black Lung Providers By State

Number of Providers

State

Alabama	54
Alaska	1
Arizona	31
Arkansas	25
California	130
Colorado	75
Connecticut	20
Delaware	9
D. C.	6
Florida	86
Georgia	23
Hawaii	--
Idaho	16
Illinois	164
Indiana	100
Iowa	37
Kansas	35
Kentucky	109
Louisiana	12
Maine	2
Maryland	51
Massachusetts	10
Michigan	62
Minnesota	6
Mississippi	12
Missouri	55
Montana	21
Nebraska	8
Nevada	10
New Hampshire	4
New Jersey	50
New Mexico	37
New York	51
North Carolina	23
North Dakota	4
Ohio	261
Oklahoma	30
Oregon	41
Pennsylvania	267
Rhode Island	1
South Carolina	6
South Dakota	1
Tennessee	74
Texas	37
Utah	26
Vermont	--
Virginia	92
Washington	43
West Virginia	125
Wisconsin	15
Wyoming	31

U. S. Total

2,389

PROGRAMS TO PROTECT WORKERS
WITH OCCUPATIONAL DISEASES

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Occupational Diseases and
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PROGRAMS TO PROTECT WORKERS
WITH OCCUPATIONAL DISEASES

Introduction

The services that an injured or diseased person will require vary widely, depending upon the nature and seriousness of the injury. Mild conditions may require only a brief visit to a dispensary, and/or a day or two away from work. In more serious cases, the need for medical care may be extensive, and, in some cases, lifelong. In addition, a wide range of other services may be required to assist the disabled person to adjust to the complex demands of society, e.g., training for a new vocation, or to improve mobility, or to enhance capability for self care; alterations in the physical demands or complexities of a job; widening doors or installing elevators or ramps in homes; counseling and psychiatric care, both for the injured person and his family; etc.

In the case of an occupational disease or injury, the responsibility for providing at least some of these services (and always medical care and income replacement) rests with minor exceptions on the employer on a no-fault basis. The majority of employers will avoid the risk of a ruinous settlement(s) due to a catastrophic accident(s) by insuring with an insurance carrier.

Program interrelationships, in the context of workers' compensation, refer to the financial and service linkages that exist between state workers' compensation agencies and workers' compensation and other private and public programs that provide

medical care, income maintenance, and social services.

Examples of public programs are the social security disability insurance program, and the State-Federal vocational rehabilitation program. The most important private efforts that are relevant to workers' compensation are the fringe benefits offered by employers.

Among the many relevant program interrelationship issues are:

(1) Are other public programs effectively coordinated with workers' compensation benefits to ensure that disabled workers receive all of the services that are needed to assist them in adjusting to the programs arising out of their disability. This would, of course, not be an issue if the employer (or his carrier) were fully responsible for these services. However, because of the doctrine of limited liability in workers' compensation, and the emphasis on income maintenance and medical care, it is unlikely that all needed services will be provided in all cases without the intervention of other public agencies. It should be noted that a great deal of judgment is required in determining whether rehabilitative and other social services are required and employers (or carriers) may be expected to resist these expenses in questionable cases.

It should be emphasized that the adequacy of programs for the occupationally ill and injured will not be evaluated on the basis of workers' compensation benefits alone, but on whether the totality of services, from all sources, fulfill the needs of

disabled persons.

(2) If services are to be provided by agencies other than workers' compensation, then: (a) who should decide which service should be provided, and (b) who should pay for them? These issues are more complicated than may appear at first glance. If the decision as to which services were needed remained entirely with the employer (or his carrier), we might expect that profit considerations would cause rehabilitation and other social services to be underprovided, especially in the case of permanent partial disabilities where the liability may be defined by a schedule. On the other hand, if the decision as to the need for services were made by State Workers' Compensation agencies, and the costs of the services were charged to the employer, there is a possibility of overproviding services, and a strong likelihood of substantial conflict between the employer (or carrier) and the state agency. Before we can deal with these problems, however, we must first ascertain what are present practices with respect to which agencies provide services and what are the effects of these practices. Are appropriate services not provided? Are unusual burdens borne by the disabled?

(3) If a disabled worker is not eligible for workers' compensation, what resources are available to provide income benefits, medical care, and other needed services an especially relevant consideration in the case of occupational diseases.

(4) How often do disabled workers receive multiple benefits, e.g., a union or company pension, workers' compensation, and social security? Do multiple benefits reduce the motivation to return to work? Do they create capricious inequities among workers.

(5) What are the incentives and mechanisms by which employers are encouraged or compelled to maintain safety programs and to re-employ disabled workers and how effective are these activities?

(6) Finally, is workers' compensation, as presently constituted, the most efficient approach to providing for the needs of occupationally injured and ill workers?

Special Problem of Occupational Disease

It is usually clear as to when, and under whose employ, accidental injuries occur. The situation is exactly the opposite for most chronic occupational diseases. This creates unique and perhaps unsolvable difficulties to determining causality in cases of occupational disease and represents the major obstacle to full coverage of all occupational disease by workers' compensation.

In not all cases of occupational disease is the issue of causation so vague. It is generally conceded that coal miners who develop lung diseases after many years in the mines suffer from "black lung" disease. Similarly, workers who have been exposed to radiation develop symptoms fairly easily traceable to the exposure.

-5-

However, these cases represent the exceptions rather than the rule. It is "suspected" that the cases of occupational disease compensated under workers' compensation represent the tip of the iceberg. The major difficulties to attributing a causal relationship between the work environment and the disease are as follows.

(1) Many serious occupational diseases develop over long time periods. The disease may be caused by hazardous exposures while working for different employers, and may not become apparent until years after the exposure, perhaps while working on a non-hazardous job, or perhaps after retirement.

(2) Many diseases have multiple causes. Environmental pollution and smoking for example, may be contributing factors even in the case of supposedly, "clear-cut" diseases such as "black lung." It may in fact, require a combination of causative agents before the disease can develop.

(3) The origins of many diseases are obscure. Statements from the Food and Drug Administration and other groups indicate that under sufficiently adverse and prolonged conditions, virtually any substance can be toxic. Unfortunately, there is a dearth of knowledge as to the toxicity of substance, both individually and combination. For example, cases of cancer that may be attributable to working with toxic substance are difficult to prove since the toxicity factor is frequently unknown and usually disputed.

-6-

(4) Most diseases may be caused by both occupational and non-occupational factors. In these cases, in a given work environment, we would observe a rise in the incidence of the disease above what would normally be expected, but be unable to distinguish between those cases that were caused by the occupational exposure and those which were not, or which cases were caused by the combined effects of both types of exposure. Almost all diseases fall into this category-heart, cancer, etc. Consider also asbestos caused diseases. Asbestos is a substance common in work areas and the general environment.

(5) In addition, psychosomatic illnesses (roughly defined as organic or tissue damage resulting from prolonged stress) are particularly difficult to attribute to job-related activities. Most people are subject to stress, both on and off the job.

(6) Finally, if one consider mental illness and substance abuse (alcoholism, drug abuse) as potentially job related, then an even more significant segment of the population could be involved. There is good indication that job pressure contribute to both substance abuse and mental illness.

These problems in determining causation are most frequently encountered in the case of occupational disease. However, it is worth noting that these same ambiguities may also arise in the case of physical injuries.

Back injuries, for example, may develop over long periods and have multiple causes, both occupational and non-occupational, and may be partly psychological in origin.

Nevertheless, the above described problems are far commoner for occupational diseases than for physical injuries and have the following consequences.

(1) It is frequently alleged that many persons with occupational diseases are not receiving workers' compensation because of the difficulty of proving the disease was work related. Many persons may not even be aware that their illness was occupational in origin.

(2) Apparently, litigation as to work relatedness is far more common in the case of occupational diseases than for occupational injuries.

(3) Because of the long time span between exposure and the outbreak of the disease, medical evidence of causation is difficult and sometimes impossible to accumulate.

(4) The issue remains unsolved as to how responsibility for occupational disease should be allocated among previous employers, a problem that may be impossible of solution if some employers are no longer in operation.

(5) The coverage of occupational disease means that employers or their carriers face a much longer period of uncertainty as to their ultimate financial liability since it may be years in the future before the last case of occupational disease attributable to this years' exposure manifests itself. This creates

great difficulties in the development of actuarially sound cost estimates.

(6) Employers may become unwilling to hire workers who have been subjected to hazardous exposures in the past, even if they show no current manifestation of the disease. Unwillingness to hire will, of course, depend upon the method of allocating the financial responsibility of occupational diseases among previous employers. The use of the "last known" employer approach would create the greatest dis-incentives to hiring new workers.

Data Problems

It is generally accepted practice of researchers in the area of disability to acknowledge that there is a dearth of meaningful empirical data and then to speculate on what the data would show if available.

The situation in Workers' Compensation is the area of program interrelationships not a total void. The National Commission on Workers' Compensation commissioned six studies dealing with program interrelationships: a survey of employer practices, a follow-up survey of workers' compensation claimants, a study of the subsequent earning of injured workers as reported to social security, and several studies utilizing existing data sources.¹ Nevertheless there remain

¹See Roy H. Kallop and Anthony J. Gripp, "Study of Employer Supplementation of State-Required Workmen's Compensation," Daniel Price, "Three Aspects of the Relationship of Workmen's Compensation to other Public Income Maintenance Programs," Walter Adams and A.J. Jaffe, "Too Little and Too Late... The Economics Plight of Very Seriously and Permanently Disabled Men and their households

-9-

in the New York City Metropolitan Area, "Wayne Vroman "Serious Injuries Workmen's Compensation, and Public Assistance in New York City," Wayne Vroman, "Serious Industrial Injuries and Worker Earnings in Florida, "and Monroe Berkowitz "Source of Information About Workmen's Compensation Recipients," in the Supplemental Studies for the National Commission on State Workmen's Compensation Laws Washington, D.C., U.S. G.P.O., 1973

deficiences in our knowledge of the relationship between the workers compensation community and other public and private programs.

The research agenda of the Interdepartmental Workers' Compensation Task Force, therefore, has emphasized collection of data needed to answer many of the more pressing questions through a series of surveys. Within the next few months, this information will be available. We will, for example, on the basis of a census of all settled cases during a restricted time period, be able to estimate the number of occupational diseases cases that are settled under workers' compensation, the types of illnesses these worker suffer, their age and sex composition, their distribution by State, the extent of litigation, and the extent of re-employment. In addition, we will be interviewing about 100 persons with occupational diseases whose cases were closed in 1973 to ascertain their adjustment to the community, and the services they have received from workers' compensation and other social and private programs. From a large sample of employers, we will obtain information on the availability of fringe benefits other than workers' compensation. A detailed analysis of State practices and laws on occupational disease will be completed.

Unfortunately, this information, from which many insights

-10-

could be drawn is not yet available. Therefore, we are by and large, still in a speculative stage.

Existing Programs

It has been suggested that many cases of occupational disease may not be compensated by workers' compensation and that, even among compensated cases, workers' compensation may not always provide the full range of needed services. What programs, then, are available to assist occupationally disabled workers **for** whom, for some reason, workers compensation is either unavailable or inadequate. In fact, there are a wide range of programs, both public and private.

In the private sector, in addition to private non-profit organizations, most employees are covered by insurance programs, frequently financed at least in part by the employer. For example, most employers provide accident and health insurance, sick leave or temporary disability insurance, and income replacement (or lump sum insurance) in the case of retirement, long term disability, or death (for survivors). These programs, which in size far exceed workers' compensation and cover non-occupational diseases and are sometimes provided in addition to workers' compensation

The public sector provide a wide range of programs.

(1) Income replacement for persons who are disabled or retired or for their dependents after the death of a head of household, is provided by social security, railroad retirement and civil service, for persons who meet the requirements as to length of employment, and, in the case of liability, recency of employment. Income maintenance to the aged and disabled is provided by the supplemental security income programs, if a pressing need for such

-11-

income is established, regardless of prior work history. In all of these programs, the person must be totally disabled and expected to remain so for a long period of time. Dependent children and their families are given income protection through the Aid to Families of Dependent Children Program. The General Assistance program will provide income benefits to needy person not qualifying under any of the above programs.

(2) Medical care is provided to persons over 65 through Medicare, and to disabled social security beneficiaries who have been receiving benefits for over 24 months from the same source. Medicaid provides medical care benefits to persons who are medically indigent.

(3) State employment agencies and rehabilitation agencies provide a wide range of services for the purpose of assisting unemployed persons to return to work, or for helping underemployed person upgrade their employment - vocational training, medical restoration, (vocational rehabilitation agencies only), job counseling, job placement, and other services.

(4) Many other public programs are available, usually without charge to the needy: mental health care, homemaker and housekeepers service, child welfare services, special housing, etc. The quality and availability of these programs will vary considerably from State to State and among regions within States.

Multiple Benefits.

Many occupationally injured and diseases workers may receive income maintenance payments from more than one program.² Workers

²No purpose would be served by distinguishing between occupationally diseased and occupationally injured workers as regards to receipt of multiple benefits.

-12-

Receiving disability benefits from Workers' Compensation may also receive disability benefits from Social Security to the extent that the combined benefits do not exceed 80% of their average current earnings before becoming disabled. There is no offset in the case of person receiving workers' compensation benefits who also qualify for social security retirement benefits after age 62, or for persons who receive survivor's benefits under both social security and workers' compensation.

Workers' Compensation recipients whose income benefits are extremely low may receive public assistance, or supplemental security income (or a combination of both) if necessary to bring their combined payment to the level of what would have been paid under supplemental security income and public assistance in the absence of workers' compensation.

In addition, some workers' compensation recipients may receive income replacement from private sources such as disability insurance from their employer or union. Or to cite another possibility, a worker may receive retirement benefits from both social security and a company or union retirement plan, and obtain a workers' compensation benefit.

Unfortunately, these are only a few indications of the number of workers' compensation claimants receiving multiple benefits. Price estimated that about 3% of all disabled workers receiving disability benefits from social security are subject to the offset because of the concurrent receipt of workers' compensation. On the basis of a 1970 survey, he also estimated that less than 1% of persons receiving OAA, AB, or APTD were receiving workers' Compensation. He noted that an unknown number of person receive both

-13-

social security disability benefits and workers' compensation but are not subjected to the offset because these benefits are less than 80% of their former earnings. In addition many recipients of social security and public assistance could have exhausted their workers' compensation benefits.³

The possibility of dual income maintenance benefits raises three types of issues.

(1) Are some workers over-compensated to the point that the combined total of their benefits equals or exceeds their pre-injury earnings. In the case of public programs, this does not appear to be a serious consideration given the 80% offset in the case of social security disability beneficiaries and the generally meager level of the supplemental security income and public assistance program benefit levels. Possibly one should consider some intergration between workers' compensation and social security retirement or survivors benefits. The National Commission recommended, in the case of survivor's benefits, that workers' compensation benefits be reduced by the amount of social security payments.

In addition to the above benefits, income maintenance payments are also, received from other employer benefits or private insurance the overcompensation could become relevant issue. However we do not know how often this occurs. Another possibility is that these private benefits may be in a lump sum, after which the person, or his survivors, may receive benefits from workers' compensation and social security.

³Price, Daniel, Op.cit. pp. 312, 314.

-14-

One should distinguish between employer financed benefits, and protection the worker acquires independently of the employer. One can argue for greater integration to prevent multiple benefits in the first case then in the second.

(2) Will dual benefits reduce the motivation to return to work. Obviously, the higher the benefits, the less, in most cases, the motivation to return to work. This is one of the oldest questions in the area of income maintenance. If benefits are too high, some workers may not return to work who, in fact, could work. On the other hand, it punishes those truly unable to work if benefits are maintained at a level low enough to avoid the dis-incentive to work.

The issue is not readily solved. The solution probably rests in the development of improved re-employment opportunities and rehabilitation efforts, and penalties against workers who do not utilize these opportunities. If such a solution could be devised, the issue of dual benefits, as regards work motivation, would be largely irrelevant.

(3) Finally, and probably most important, is the issue of equity. As a matter of social policy, is it desirable that some workers should receive greater levels of income maintenance than others solely because they worked on jobs covered by social security and had accumulated sufficient quarter of coverage to be insured, and because they also meet the test of being currently insured. Persons with progressive diseases may have been unable to gain enough quarters of recent coverage to

-15-

qualify for disability benefits under social security regardless of the total number of years they have worked.

In short, how well off a person is after becoming occupationally disabled depends upon a number of capricious factors--i.e., persons who are young or who have progressive diseases are likely to receive the least income maintenance.

If such capriciousness is thought undesirable, there are a number of solutions. Benefits levels under workers' compensation could be increased to a level that would eliminate most cases of dual benefits due to the 80% offset rule. Or, the situation could be improved by eliminating the recency of work test for disability benefits under social security which would help persons with progressive diseases,

Uncompensated Cases

Because of the difficulty of proving causation, occupationally diseased workers face considerably greater obstacles in establishing their right to benefits than injured workers and it is possible that the great majority do not even make the effort. What happens to these uncompensated cases (as well as uncompensated cases among injured workers)? There are many possibilities,

Workers whose disease breaks out while still employed may find their medical costs fully covered under accident and health policies carried by the employer, and their income losses fully or partly compensated by sick leave and temporary and permanent disability insurance.

Not all workers will be so fortunate. Others, working on jobs with less liberal benefits. Or who have not yet worked long enough to be eligible for some fringe benefits, or who have left the labor force and are no longer working, have fewer options. Some, if permanently and totally disabled, will qualify for social security (or railroad retirement or civil service) disability benefits. However, they will have to depend upon their own resources for medical care (unless they have been receiving disability benefits from social security for two years or more) or will have to establish the fact that they are medically indigent, a condition to which, given the high cost of medical care, many will be driven quickly.

Other workers will be covered, in part or in total, through insurance policies they have acquired privately. In some cases, these may supplement social security payments. If occupationally diseased workers do not qualify for any of the above benefits, or if their benefits are inadequate for their needs, then they must either apply for supplemental security income and/or public assistance, or rely on their own or their relative's resources. In the cases of permanent total disability, these latter resources are likely to be rapidly exhausted.

It should be noted that persons with permanent partial disability will not be provided income benefits by social security or supplemental security income although it is possible that some persons judged to be partially disabled under Workers' Compensation will be declared totally disabled by the public programs.

-17-

The conclusion must be drawn that even if not covered by Workers' Compensation, occupational diseased persons unable to work can usually obtain essential food, shelter, and medical care from one or more of the other public or private programs. Partially disabled persons must provide for their income needs through their remaining earning capacity, although medical assistance may be available to them through private insurance or Medicaid.

However, the following problems arise.

(1) Cost that are, in fact, attributable to the cost of producing goods and services are not being attributed to industry except to the extent that these costs are being borne by company paid fringe benefits plans.

(2) The permanently partially disabled (with occupational disease) may receive nothing unless covered by company fringe benefits plans.

(3) The level of income maintenance is likely to be much lower under social security than under workers' compensation for most workers. Beneficiaries who rely solely on supplemental security income and/or public assistance, are usually forced to a poverty level.

(4) To receive supplemental security income and/or public assistance, workers must, effect, become impoverished in order to qualify for benefits.

(5) Capricious factors determine whether a particular disabled worker, not covered by workers' compensation, receives comparable and adequate benefits from other sources, or is able

-18-

to qualify for social security, or is forced onto supplemental security income and/or public assistance.

(6) Other important services, such as special housing modification or mental health treatment will not always be available from public agencies, or, if available, the worker will have to pass a "needs" test in order to receive these services without cost.

(7) Many private accident and health policies and disability policies have stated limits as to liability so that disabled workers who rely on these forms of protection may not be fully protected.

Alternative Approaches

Most people would agree that if a disease is caused in part or in total by a work environment, the worker should receive benefits from workers' compensation. Implementation of this goal requires that there be a realistic method of determining that the diseases was, in fact, caused by the work environment.

Some people doubt that realistic criteria can be set for ascertaining the occupational origin of many cases of occupational disease. Suppose, for example, that for a given occupation, the prevalence of heart disease was 50% greater than normal. In effect, one out of each three cases of heart disease among workers in that occupation would be occupationally caused. But how could these case be separated from cases of non-occupa-

tional origin. Evidence of direct medical causation is almost impossible to obtain. One could use presumptions which, in effect, would blanket in all cases of heart disease among workers employed in that occupation for more than a given number of years. But is unlikely that industry would accept an approach that would encompass a large number of cases of non-occupational origin.

We are left with the strong possibility that workers' compensation is not a viable approach to compensating many cases of occupational disease. Nevertheless, many of these diseased workers will require medical care and income maintenance.

The present situation, despite some efforts to provide workers' compensation benefits to all occupationally diseased workers would not appear to be a particularly desirable one. The compensability of persons claiming benefits because of occupational disease is frequently litigated. There is considerable uncertainty as to what types of diseases will be covered and under what circumstances and how many such cases exist. Coverage of occupational disease appears to be expanding haphazardly as a result of judicial decision. And employers are extremely uncertain as to their probable future liability under workers' compensation to their present labor force.

Suppose coverage of occupational diseases by Workers' compensation was limited to relatively clear cut cases. One might, for example, include only cases where there was direct medical evidence of causation, or cases where the probability that the disease was occupational in origin was at least 80%-i.e., those situations where the prevalence of the disease among workers who have worked a specified number of years in a given situation is

-20-

at least five times the prevalence of the disease in the general population.⁴

What of the remaining cases who may well exceed, in numbers, those who are covered by workers' compensation. One possibility is to continue with the status quo. As noted above sufficient programs exist so that disabled workers may always obtain basic food, shelter, and medical care. Many people, however, would object to continuing the status quo because of low income maintenance benefits paid to some workers the capricious factors that determine which workers receive low benefits, and the need to establish indigency as a condition of medical care and income maintenance for supplemental security income and public assistance.

A second possibility is for employers to assume responsibility for both occupational and non-occupational injuries and illnesses. In fact, they may wish to carry both types of coverage in a single policy or by self insurance. It would then become irrelevant as to whether a disease was occupational in origin or not.

The 80% figure is arbitrary. It could be higher or lower. For example, one might want to use 50% requiring that the prevalence be twice normal or some other standard. The point is, some workers whose disease is occupational in origin will be left uncovered. The lower the standard, the fewer will be the number of occupational disease cases left uncovered by workers' compensation, but the greater will be the number of cases of non-occupational coverage that will receive benefits. In any event this approach is not as clear-cut as appears at first glance. Suppose that the average incidence of a particular disease for persons of working age was one in 500. With five plants of a 100 workers each, the disease would be expected to occur once. The prevalence of the disease within the plant where that worker was employed, however, would be five times normal, although the disease is probably not occupational in origin. One could expect considerable litigation over this issue.

Since most employees are currently covered for non-occupational injuries and illnesses through group insurance policies where they work, this would not involve a significant increase in costs for most employers and in fact, may even reduce costs in some instances if there are economies (e.g. in administration or reduction of litigation) in combining the two types of coverage occupational and non-occupational in one policy.

One problem with this approach is that it would require restructuring of present workers' fringe benefits packages to make the benefits for non-occupational illnesses and injuries comparable to the benefits under workers' compensation. Another serious obstacle to this approach is the need to provide coverage to workers who develop occupational disease after leaving the company where they suffered hazardous exposures. Those that go to other employers could, conceivably be covered by the benefit package of the subsequent employer. If not subsequently employed, however, we are again faced with the problem of showing a causal relationship between the job where the hazardous exposure occurred and the disease. It would be unreasonable to expect an employer

* Mr. Howard Clark of the Federal Insurance Administration suggested that if employers were allowed the option of combining occupational and non-occupational coverage for workers, competition between carriers offering the traditional workers' compensation policies, and those offering the combined policies would provide incentives for maximizing efficiency.

-22-

to assume responsibility for all subsequent non-occupational injuries and illnesses.⁵

Another approach is to anticipate the eventual passage of Federal legislation for national health insurance and guaranteed family income. All persons, including the occupational diseased would be guaranteed adequate medical care and a guaranteed income would be provided to most persons, although probably at levels somewhat below what workers would be entitled to under workers' compensation. Such an approach would not necessarily mean the end of workers' compensation. For example, workers' compensation could continue to function as at present with national health insurance and a guaranteed family income plan being set up so as to fill in the gaps for uncovered workers. Or, these plans could provide benefits to persons as they are needed, and then, in workers compensation cases, be re-imbursed by employers (or their carriers). This latter approach has the virtue that benefits would not need to be delayed until the question of compensability was decided.

* Mr. Howard Clark of the Federal Insurance Administration observed that many employer insurance plans contain a conversion privilege so that at retirement, a worker would have the option of continuing his insurance coverage. Actually the absence of workers' compensation benefits may not be a particularly pressing problem for retirees since most will be eligible for medicare, or have medical coverage under other policies. The more serious problem relates to workers below retirement age, who may become disabled from an occupational disease after leaving the labor force, and then be unable to re-enter the work force. Housewives and students are the largest groups in this category. In these cases, substantial hardship would result if the causal relationship between the job and the disease could not be established.

We are not recommending any of the preceding departures from the present systems of workers' compensation. We are presenting them as alternatives that must be considered if meaningful guidelines for establishing the occupational origin of most cases of occupational diseases cannot be established soon.

A Cost Fallacy

The magnitude of the problem of occupational disease is unknown, but presumed large by many people. The number of cases compensated for occupational disease by workers' compensation is relatively small, at least compared to the suspected magnitude of the problem. The prospect of a major increase in benefit payments due to covering the occupationally diseased through workers' compensation causes substantial concern among some persons as to whether the nation can afford such benefits. This concern is based on a fundamental fallacy.

The cost to the nation, i.e., the social cost of occupationally disease is not determined by the level of benefit payments. Social cost is measured by: (a) the decrease in productive activity because the worker is temporary or permanently disabled; and (b) the cost of medical care, rehabilitation and other supportive services provided as a result of the disease.

-24-

Benefit payments are the means by which the costs of the disease are borne by persons other than the disabled. If there were no benefits, the disabled workers would bear the full impact of the disease. Workers' Compensation benefits reduce the cost borne by the workers by the amount of the benefits and distributes the costs of these benefits to the consumers of the goods being produced by the workers when they sustained disabling illnesses or injuries.

The issue is not whether industry can afford to pay compensation to the occupationally ill. Rather, it is whether the burden of occupational disease should be borne by industry, by the disabled workers, or by the general taxpayers vis-à-vis social security taxes or taxes paid to provide public assistance and supplemental security income.

Of course, industries with a high rate of occupational disease could be substantially impacted and forced to raise the prices of their goods in order to cover costs. Sales could be restricted and employment in that industry reduced. The necessary consequence is that workers would move to other jobs to produce the goods and service that consumers have opted to purchase because these goods would now be relatively less costly than the goods produced in industries with a high prevalence of occupational disease. This is not detrimental to industry as a whole or to the economy. In fact, it is helpful as it assists resources to flow to those areas where they can be most efficiently used.

Ultimately, there are only two ways to reduce the costs of industrial accidents and diseases--prevent the injuries and diseases, and re-employ persons who become disabled. If industry become fully liable for the costs of occupational disease, they will be encouraged to reduce costs through prevention and re-employment. In effect, from a social standpoint, it may be more costly to the economy not to charge industry with the cost of occupational diseases, than to charge industry with the cost.

Summary

It is generally agreed that occupational diseases should be covered by workers' compensation. It is suspected that a majority of cases of occupational disease are not compensated.

The critical question for the coverage of occupational disease by workers' compensation is whether meaningful criteria for determining whether a disease was work related can be developed. The long latency period of occupational disease, the difficulty of obtaining a medical history, and the many exposures, both occupational and non-occupational which can cause a disease, make this a difficult task and, for a significant number of cases, probably an impossible one.

There are other mechanisms by which income replacement and medical care are made available to disabled worker - social security, railroad retirement, civil service, private insurance, etc. In some cases, workers may receive dual benefits, but this does not appear to be a particularly pressing problem, at least for public programs.

If an occupational disease case is not compensated by workers' compensation, the person can usually obtain benefits elsewhere, although at considerably lower levels than in workers' compensation.

If meaningful criteria for determining the work relatedness of a disease cannot be developed, then alternative methods of providing protection to these workers must be considered: expanding employers' responsibility to include both occupational and non-occupational injuries and illnesses is one possibility; national health insurance and a guaranteed family income is another.

It is sometimes asserted that the nation cannot bear the cost of providing benefits to persons with occupational diseases. This is wrong. The nation always bears the full cost of an illness or injury. The only issue is how this cost will be distributed.

THE COSTS OF OCCUPATIONAL DISEASES

Prepared for the Conference on Workers' Compensation
and Occupational Disease - The Interdepartmental
Task Force on Workers' Compensation

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Part I

The purpose of this paper is to set forth the issues that are raised in the attempt to estimate the costs of occupational disease. The effort will disappoint those who believe that such a number exists and awaits only to be unearthed by appropriate search and digging. While a range of figures could be developed that might encompass the correct datum, this paper will explain the perils inherent in such an effort. Though much of the essay emphasizes the shortcomings in quantitative estimates of the problem, the second part of the paper will demonstrate a technique that provides some dimensions of the occupational disease question in the case of a single hazard within a limited industrial context.

1. The Desirability of Establishing Cost Estimates.

Despite the burgeoning body of literature that is reflecting the changing social awareness of the occupational disease problem, it seems not unfair to note that much of the knowledge being generated takes the form of identifying new mysteries. Some of the most fundamental questions regarding occupational diseases have only been posed recently and answers would appear to be years or even decades off. On that basis why should much attention be given to the area of the costs of such diseases? There are probably four reasons at

least why one might like to have such estimates. First, such a figure would provide a simple unit of account that would allow one to summarize the costs of all varieties of disablements associated with any kind of occupational disease. Economists learned long ago that while apples and oranges may not be readily added, their separate values could be determined and then combined. Thus, for those eager to assess the dimension of the occupational disease problem, cost estimates may provide a method to express that magnitude.

Two other reasons to attempt such an assessment are closely related. A single estimate, especially if it is large enough, can capture the attention of the media, thereby assuring that the public's interest is captured at least for the moment. Such interest would have several salutary effects that need not be enumerated here. Also, such an expression of the dimension of the problem can much more readily be understood, at least superficially, than can the morbidity statistics that regularly emerge from the Health Interview Survey of the National Center for Health Statistics.

The related reason is that such estimates will be used as weapons in a legislative conflict that will surely develop regarding workers' compensation programs. The impact of such data cannot be predicted yet. A very large figure, say twice the current cost of all state compensation programs, would certainly generate excitement as well as suggest important shortcomings in the programs designed specifically

to cope with this problem. It might sound the death-knell for the workers' compensation system entirely, or at least for that part of it meant to handle the problem of diseases.¹ On the other hand the presence of significant cost discrepancies between estimated actual costs and current benefit levels could also intimidate all but the most venturesome and might result in very modest efforts to cope with the problem. I doubt that the Congress would have supported the 1969 Black Lung legislation in the form that it did had the eventual program costs been known. Less speculative is the observation that many states wrote special provisions that limited benefits for the "newly discovered" occupational diseases of the 1930's, on the grounds that to compensate them like any other impairment would have been too costly for employers. Note that some of these "temporary" expedients of forty years ago still exist in various state laws. Thus, a Catch-22 would seem to be that the higher the estimated costs and the greater the recognition that a large problem exists, then at the same time, the larger the need for caution by budget-wary legislators and government executives.

A more compelling case for the derivation of such aggregate cost estimates is to use them for comparative purposes alongside current expenditures (or anticipated ones) that are intended to ameliorate or reduce the occupational disease problem. If it could be demonstrated that some extremely large economic costs were being incurred for the sake of substantially smaller or even equivalent ameliorative investments in things like working conditions, perhaps appropriate legislative

- 4 -

remedies would quickly be found. Such cost data might be used in several ways. While employers might object to more stringent workplace standards on the grounds of cost, worker groups could point to the costs to them and the community of less rigorous ones. Thus, for example, if improved dust control methods in the workplace cost X , such an expenditure could be put into a rational perspective if the costs of disease (as yet undefined here) were reduced by $1.5X$ or by $.0005X$. In a related manner if the costs of research on occupational diseases represent a trivial fraction of the total cost of the problem, it could well suggest that increasing such expenditures could yield very large returns in terms of reducing such societal burdens. Conversely, if research expenditures currently represent a very significant portion of the overall costs of occupational disease, it would seem that a reallocation to areas of higher priority would be warranted. Obviously, such arguments must be supported by some underlying notions about the form of the relationship between the resources devoted to research on the problem and the output of that research, i.e., the production function of knowledge.

While the four arguments presented above indicate why the development of a cost figure may be desirable--and how the Task Force might employ such an estimate--some consideration ought to be given to the possible impropriety of such an exercise. That is, aside from the basic problems to be noted later, it may be as risky to pin a cost tag on occupational diseases as it was for NIOSH to simply assert in its first report to the President that at least 100,000 fatalities occurred each

year from this source.² The absence from that report of any evidence to support this contention meant that certain groups, eager to minimize the problem, could readily dismiss it. Stated more directly, a single cost estimate provides a fairly simple, stationary target for anyone wanting to make the problem appear either more or less severe. If nothing else is known about the state of our knowledge about disease, it is certain that in each of the next several years new hazards and new diseases will become recognized, thereby tending to push higher any single over-all estimate of costs.

2. A Framework to Estimate the Costs of Occupational Diseases.

Assuming away for the moment problems of measurement and data availability, estimating the costs of occupational diseases poses no special problem for the economist. Costs, typically, are treated as resources used or lost as a consequence of the disease. There are two primary sources of costs due to such diseases. First, and probably largest, is the loss to society at large of the incremental contribution to product that a sick worker cannot produce. A worker that becomes ill or even dies ceases to be a contributor to the economic well-being of society and as such, we forego the value of his contribution. Except for a qualification that will be noted later, this economic loss is readily calculable by resort to the standard assumptions--and conclusions of neoclassical economic theory. The foregone value of the workers' services are estimated to equal his wage (broadly construed so as to include all fringe benefits). If

a year of work is lost the costs to society equal at least the annual earnings of that employee, regardless of whether the employer has replaced the person with another employee.

Since many years of work may be lost, particularly in cases of fatalities, the costs can be presented in several ways. Customarily, economists would report the present value of the future stream of losses that will be incurred, based upon a disablement that began in the present year. Such a calculation involves the summation of all such costs, appropriately discounting future costs to the present period. Thus, while \$1000 of foregone product in this period represents a cost of \$1,000, a loss next year of a \$1,000 in foregone product is the equivalent of \$900 loss in present value where the discount rate is set at 10 percent. Because the choice of an appropriate interest rate is necessarily somewhat arbitrary, estimates are occasionally prepared using two or three different rates, thus allowing a range of costs to be presented. The challenging task, however, does not involve the discount procedure, but rather, the assumption about the extent of future wage losses. Since one cannot know how much the victim would have earned next year, much less 10 years from now, the technique employed customarily involves the derivation of an age-earnings profile based upon the worker's demographic and skill characteristics. Holding constant such typically significant determinants of earnings such as race, educational attainment level, marital status, health (prior to the occurrence of this disease), and region,

one can trace out a profile of earnings for workers in that occupation-industry classification that varies only for age. A final step is to assume not only the hypothetical completion of the person's working years, but that the existing age-earnings profile systematically underestimates future earnings losses due to some assumed rate of growth of productivity of all workers (or at least those in that occupational-industrial classification). The sum of all such estimated earnings, appropriately discounted, represents as a minimum the economic costs of the occupational disease of an individual worker. Such costs surely represent the major component of the costs of work-related illnesses.

There are several ways to aggregate across all workers this portion of the costs of occupational diseases. One method would be to ask what is the total value of output of the present year that is lost due to this source. This technique would focus upon the current year as the relevant time unit. It would require estimating the losses due to illnesses and fatalities that began to be incurred this year as well as the costs of diseases that occurred in earlier years where the loss continues to be manifested. In that case, for example, we would ask what a 55 year old miner would have earned in 1975 had he not been permanently and totally disabled in 1970 at the age of 49. To perform such an exercise over an entire simulated labor force seems unthinkable. Instead, the more customary technique would be to ask instead what are the current annual costs (or the present value of the future stream of earnings foregone) of diseases that become manifested in the current year. Note that the differences represent not only alternative methods of calculation--they actually involve significantly different questions.

The calculations described above can be accomplished in either the case of total or partial earnings loss. Conceptually, there is no problem in dealing with less than complete earnings loss. The problem of partial earnings loss is entirely one of measurement. In the presence of data the framework described above can easily be used to estimate the costs of diseases that permanently or temporarily disabled workers, either totally or partially.

Thus far the only costs of occupational disease that have been described involve "opportunity costs", or the loss of foregone output. Additionally, one must also add to the costs of diseases the resources expended to diagnose and treat persons so afflicted. Not only do such direct costs include the total of medical, hospital, drug and rehabilitative resources used, in the aggregate one should also include the costs of research on all aspects of identifying and dealing with the disease. Obviously, the latter presents some problems where the disease may occur primarily as an ordinary disease of life, and only on limited occasions occurs because of work-related phenomena. The bulk of these direct costs have been calculated at times, however, though current data are lacking that allow the exercise to be carried out. The Department of Health, Education and Welfare has published, periodically, the hospitalization and drug costs of various diseases and limited data exist on medical care costs as well as other rehabilitation costs.³

Since costs are defined as real resources used or foregone, it is important to note that they do not include transfer payments from an employer, private insurer, social insurance source or welfare to a

worker or a survivor. Such transfers neither enhance nor reduce the resources that society commands and as such are not considered in this cost calculation. Conversely, if for one reason or another services are provided to a sick worker on a subsidized basis, e.g., a plant physician treats a patient without charge or hospital expenses are reduced due to some public subsidy to the institution, an imputation must be added to the costs so as to correctly include the full value of the resources used.

A third set of costs involves those resources that are employed in administering the systems that exist because occupational diseases occur. Thus, while workers' compensation benefits or damage suit awards are transfer payments, and, therefore, are not to be considered as costs, resources are expended in administering such programs. The summation of fees, court costs, and the expenses of state agencies and insurance carriers may be small when viewed against the entire set of costs involved with occupational diseases. For some classes of diseases, however, these costs may be fairly significant. Thus, while dermatological disease cases may rarely be contentious, heart disease claims are very often litigated, suggesting that the administrative costs of such cases may be relatively large.

While the economist feels comfortable about his use of the term costs it is obvious that those who believe that cost estimates are needed may have a different perception of what that implies. For example, while the economist gives somewhat limited attention to

transfer payments since they involve no resource gain or loss, such flows clearly do affect the earnings of the employer and the household. Thus, as a subsidiary exercise to a calculation of the costs of occupational disease, one might assess the "economic costs" to the employer, the worker, or to government. Superficially, for employers or for government these would include direct payments to workers or their survivors and to providers of health-rehabilitation services in the event an occupational disease occurs as well as indirect payments through the payment of insurance premiums. For the worker or his survivor, analagous costs involve any direct expenses and indirect ones, i.e., foregone earnings, that are not compensated.

The framework described above to calculate the economic costs of occupational diseases is a manageable one. While the economic questions involved are formidable, they could be dealt with in the presence of adequate health-incidence data. If data of quality existed on morbidity and fatality incidence--and they do not--a cost calculation could be undertaken. However, certain conceptual issues would first need to be resolved. Obviously, before calculating the costs of such diseases we would need to arrive at some agreement as to what constitutes an occupational disease. This is no simple matter. Some diseases which are obviously widespread and costly immediately present problems. For example, while alcoholism and job-related stress are often linked, the direction of causality is unclear. Moreover, the socio-economic characteristics associated with alcoholism may well be correlated with the person's choice of occupational-industrial

endeavor. Thus, both alcoholism and job stress may be dependent variables and correlated because of their separate functional relationships to unspecified independent variables. While a very large range of estimates of the costs of alcoholism have been made in recent years, all of them are absolutely large numbers.⁴ If alcoholism is considered an occupational disease it would surely affect the magnitude of any estimate of occupational disease costs.

One can readily become intimidated by the scope of this issue by substituting the term psychiatric disorders for alcoholism. Evidence of greater and lesser quality abounds on the relationship between job characteristics and emotional problems. If one is inclined to incorporate such illnesses (and their attendant costs) into an analysis of the over-all costs of occupational diseases, they might also consider including both the symptoms generated through job insecurity and fear of job loss, and those that arise when persons are without work and unable to find suitable employment. This is not to belittle the matter of emotional disturbances or to suggest that they ought not to be included in an estimate of disease costs. Rather, it is to point out the significance of the definitional problem before one attempts to estimate the costs of occupational diseases. Unless one deals with a well established hazard such as carbon disulphide, which has been demonstrated to be linked to suicide rates of rayon workers,⁵ one is tempted to dismiss psychiatric problems related to work-place phenomena. Given the very large economic costs of both alcoholism and emotional disturbances, varying assumptions (in the absence of better

information) about the proportions that are occupationally related will almost certainly create large swings in the estimates of the costs of all occupational diseases.

The need for an acceptable definition of occupational diseases as a first step in analyzing the aggregate costs of such illnesses is also evident when we consider the problems of cardiovascular cases. Clearly, one can readily and substantially manipulate the estimate of the costs of occupational diseases by raising or lowering one's assumptions about the work-relatedness of such diseases. The problem essentially derives from the legal handling of medical questions of etiology and aggravation and not from the economic analysis that attempts to set costs on these cases. To conclude, without both more solid incidence data and some agreement as to what constitutes an occupational disease one cannot quantify the extent of the problem in the aggregate. With the exception of isolated case studies the costing exercise becomes a fairly empty one.

Several other conceptual problems must be noted also. It should be apparent that the economic calculus described earlier provides no cost estimate for the pain, suffering, embarrassment or some general loss of the sense of well-being that may be incurred by the worker or his family. Unless real resources are somehow expended or lost, there is no cost attached. If the worker continues to work his regular hours despite his illness, it will not be incorporated into the costs unless productivity is also impaired. A more disturbing implication of the technique is that diseases to non-workers would involve no economic

costs--except those involving diagnosis, treatment, and so on. This presents particular problems when dealing with the diseases of long latency. If the exposure to the hazard occurred during the working years, but the disease only manifests itself after retirement, we would measure no foregone earnings. (Obviously, this has implications not simply for the academic task of assessing costs, it has several very practical implications for the eligibility for workers' compensation benefits.) In Part II of this paper some simulated data are presented that demonstrate the relatively inexpensive nature of a long-latent disease precisely because few working years are lost by the worker to the economy. Other affected non-workers could include spouses or other family members to whom occupational hazards are transmitted (mesotheliomas in the wives of asbestos workers), or who suffer from reproductive disorders (as in the homes of uranium miners or operating room personnel.)

The methodology described so far raises certain questions that have begun to disturb some economists. An entirely different framework is only now beginning to emerge and it is too early to appraise its attractiveness.⁶ Rather than measuring the economic value lost due to accidents or illnesses by the foregone product (equivalent to wages) approach, the loss would be calculated on the basis of the assumed expenditure the worker would make in order to avoid incurring the disability due to the accident or illness. This framework can take account of imperfectly operating markets that exist due to immobile labor or inadequate information. Such a technique would inevitably increase the estimates of disease costs.

3. Empirical Needs and Data Problems.

The critical problem in assessing the costs of occupational diseases is not in the lack of an adequate conceptual framework, nor in potential areas of controversy such as the handling of alcoholism or psychiatric impairments. Rather, huge voids exist in our understanding of the sources of all occupationally related diseases, and the characteristics of the workers involved. At a minimum the following kinds of data are needed before aggregate cost estimates can be made.

The numbers of workers exposed to the various, specified hazardous substances. Except in rare instances or for small case studies such data do not exist presently. There are extremely serious shortcomings with the published NIOSH estimates of the number of workers exposed to various substances that appear in the separate Criteria Documents and the Background Information letters. Such NIOSH estimates cannot be used to serve the purpose of anticipating (or retroactively estimating) the potential numbers of persons that may develop illnesses associated with the substance in question. Given both the number of persons exposed, and the extent of the exposure, the incidence of disease can be estimated where the functional relationship between dose and response is known. Additionally, the length of the latency period and the degree of morbidity or the probability of fatality must both be estimated. Obviously, our empirical needs already are stretching the limits of our knowledge except for possibly a very few substances.

Next the age, race, sex and marital status as well as occupational-industrial affiliation of the exposed workers should be derived so as

to link the economic costs with the incidence of impairment. For each occupation-industry category for example, a separate earnings profile should be developed along with the systematic estimates of working-life expectancy since we know that retirement ages vary by type of work performed. Additionally, separate estimates should be made of the probability that individual workers will hold second jobs. It is necessary, further, to derive some imputed value of the services rendered outside the market nexus by the worker so as to fully value the loss of the person's economic contribution.

It is clear that some of the above data are already available while others, currently, are far from calculable. Obviously, it is the medical-health parameters that are furthest from being understood. But less obvious is the observation that quantitative estimates of the needed health data have been developed thus far largely for fatalities. Morbidity data from work-related illnesses have barely been developed, much less analyzed. While matters of life and death may demand more immediate attention than those of temporary illness, the latter problem, along with permanent impairments probably swamps the former in terms of economic loss. Not only are the numbers of workers who lose time from employment or who work at reduced levels of productivity due to work-related illnesses far greater than the number who die from such diseases, the sum of the direct and indirect costs per case may be close to equal in fatal and non-fatal cases, when one drops out those instances where diseases involve very little if any lost work-time. The importance of the costs of morbidity derives partly from the possibility that a younger

person may require decades of health-rehabilitation services after developing an occupational disease. In such a case the costs would involve some substantial cumulative reduction in lifetime work. Since many of the occupational disease fatalities occur only after many years of continuing exposure and/or periods of long latency that may stretch out from 3 to 4 decades, the differential cost implications are clear.

While the absence of morbidity data is obvious to anyone examining the occupational disease literature, few observers have pointed to the need for such information, partly as a useful tool in the setting of public priorities. In a recent interview with NIOSH personnel, it was made clear that virtually no attempt is being made to estimate time loss, yet in the absence of such data one is virtually obliged to exclude such cases from a consideration of the costs of occupational diseases. However, since such costs probably exceed those due to fatalities an obvious dilemma exists.

4. Who Pays the Costs of Occupational Diseases.

Thus far this paper has dealt with the economic losses due to occupational diseases. It has not covered any of the distributional aspects of the disease problem, i.e., who pays for the costs of occupational disease. No adequate answer yet exists for this matter, but here too, some elements of an analytical framework have been developed, in the absence of data that would allow some meaningful estimates. Some very small forward steps have begun in evaluating the cost burden of the workers' compensation system in Vroman's paper for the National

Commission on State Workmen's Compensation Laws.⁷ His concern, primarily, was with the costs of insurance and did not directly confront the possibility that compensation benefits do not fully replace the expenses a worker incurs who has been disabled on the job. Because the National Commission found that the state systems typically were both inadequate and inequitable in this regard,⁸ that issue need not be developed again. Suffice it to say that in a vague and superficial way, where the system does not fully compensate disabled workers, the costs are largely borne by the worker or by society at large.

But this is very far from the full story. For the case of most accidents and injuries--and in some cases of occupational disease--compensation costs flow out of premiums paid by employers on covered payrolls. Such costs are precisely akin to a tax on wages (much like social security, unemployment insurance, etc.) and raise the price of labor to employers. For some firms the tax will be stiff while for others it will represent a trivial part of payroll expenses. The imposition of (or increase in) this tax may be fully borne by the employer in the short run or may be immediately "shifted forward", and the price of the product raised sufficiently to fully cover the costs of the tax. But an increase in the price of the product will cause the quantity of product demanded to decline, and thereby raise the level of demand for other goods, primarily untaxed substitutes of the good in question. Thus, most firms will find resistance to fully increasing prices by the level of the tax and, instead, will attempt to "shift backward"

the tax burden by keeping wage levels from increasing as much as they otherwise might. Note that where such taxes are fully shifted backwards, the compensation costs are borne by labor despite the appearance that it is the employer who is paying the costs. If the tax is only partly borne by labor and by product purchasers in the form of higher prices, some of the burden will fall upon the employer. While capital may be immobile in the short run, this is not so for the longer run and it will be reallocated to those sectors where the return on investment has not declined.

The full scenario cannot be worked out here. Hopefully, however, the naivete is apparent of the early compensation theorists who sought to have the product bear the cost of accidents.⁹ Depending upon demand and supply elasticities in the product and factor markets, and upon the elasticity of substitution between labor and capital, the cost of compensation will be borne in varying proportions by labor, capital, and product buyers. This analysis is more fully and elaborately provided by Vroman. Unfortunately, it yields no special insights into the quantitative burden that each of the parties must absorb.

The above analysis must be modified for the case of occupational diseases in recognition of the manner in which they differ from accidents and injuries. Two quite different kinds of analyses can be developed. First, assume that employers and workers are aware that a disease problem exists due to the work, but that the opportunity to be compensated for such illnesses is negligible. The absence of

compensation benefits could be accounted for by several things including, problems in establishing proof, "tough" courts and compensation agencies, the presence of a narrow and limited schedule of covered diseases, and so on. In such a case where labor is mobile it will move to other industries where wages are comparable, but working conditions are more healthful. To retain labor the firm will be forced to pay some premium to compensate for the unpleasant circumstances of the work place. Yet, this will make labor more expensive and as the firm has the opportunity, it will change its production processes so that it can substitute more equipment for labor. As the price of the product increases because of the increase in labor costs, it will cause buyers to seek out substitute products. Note that this abstraction would seem to perfectly describe the conditions prevailing in the labor market for coal miners up until the present decade. It probably characterizes the labor market for asbestos workers as well. In any case, such a model would suggest that even where no workers' compensation is paid, the market causes some of the costs to be borne by non-workers. Additionally, for those workers who earn the wage premium for engaging in a risky operation, but who do not ever contract the disease, they collect a rent that partly balances the losses of those who contract the illness but receive no compensation. Thus, one ought not to assert that workers bear most (or all) of the costs of diseases where no compensation is paid. Such an argument seemingly neglects to include the remuneration received by all of the exposed workers in the occupation or establishment in question, not simply those who fall victim to the disease.

The second analysis, that may more accurately describe the situation of occupational disease than does the model found in Vroman, begins with the assumption that no compensation is provided and that employers and workers are largely ignorant of the risks of the work. Such cases are probably most frequently and significantly associated with diseases of long latency. They would involve illnesses that the scientific community has not or is only beginning to link up to workplace exposures. Even within this broad grouping one could find numerous examples where some wage premiums are provided--and hence similar to the model described previously--although in this case there is no recognition of a disease problem. These cases would occur where the hazards, though not understood to be associated with a greater probability of "premature" mortality or morbidity, create sufficiently unpleasant working conditions so as to command compensating wage differentials. Examples of this would include premiums for highly stressful work (air traffic personnel, certain executive positions, etc.) or for employment under hot, dusty, noisy conditions (the top side of coke ovens, foundries). Aside from these positions that do involve additional pay for conditions that give rise to health problems but where no understanding of the potentially precarious nature of the work prevails, there exists the example of ignorance and the absence of a compensating wage differential. Thus, while working conditions may appear to be healthful, they are not, but neither the employer nor the worker have yet perceived the risks. Obviously, without a workers' compensation premium or a wage differential that reflects the disease

problem, neither the price of the product nor the capital-labor ratio will be affected and the burden of the disease will fall largely on the worker (and his household) or the public (through the subsidization of health and income maintenance efforts of government). Surprisingly, though, it would be wrong to conclude that the employer and the price of the product are totally unaffected even in this circumstance. At least two sets of costs are still borne by employers here. First, the firm must absorb some of the costs of unanticipated (and presumably higher than otherwise) turnover. Incurred expenses would include sickness insurance and possibly life insurance, as well as the costs of severance, recruiting, training, and so on. Secondly, where workers have received training specific to the firm, unanticipated turnover (or time lost due to morbidity) means that the employer's investment in his workers will be jeopardized. Unlike the situation where the employer anticipates the development of a disease-- hence providing little or no specific training, or making certain that the period set to recoup the investment is a short one--the employer finds that his investment in labor has been less profitable than anticipated or simply unprofitable. Thus, even under these circumstances the employer bears part of the burden, and by shifting forward some of these will likely involve also the product price. Obviously, the employer's burden becomes quite small where no specific training has been provided.

Earlier it was noted that even where some workers absorb a large share of the costs of occupational disease, the over-all costs to labor may be somewhat smaller, since other workers may receive a risk premium

without actually contracting the disease in question. There appears to be an analogy in the case of employers, again due to the peculiar nature of some occupational diseases. That is, given the long latency period of some illnesses, and given that turnover of labor occurs for many reasons other than job-related health, some of the cost burden imposed on an employer as described above will result from exposures encountered many years earlier, elsewhere. While the workers' compensation system permits--but one rarely finds--apportionment among involved employers, in the absence of compensation and in the presence of ignorance regarding causality and degree of earlier exposure, the market mechanism does not assure that the employer share of costs becomes distributed equitably.

5. Cost Estimates.

Given the enormous degree of uncertainty regarding the incidence of occupational diseases, global estimates of costs would appear to represent an almost irresponsible act. Some more limited alternatives exist, however. One possibility is to examine some of the case studies that the epidemiological community has identified. This will be done in the course of Part II of this paper.

A second possibility would be to limit the analysis to fatalities only, recognizing that these underlying data are slightly less soft than those that are supposed to cover morbidity and mortality incidence jointly. That partial analysis would grossly underestimate the costs of disease, but it would focus public attention on the dramatic cases.

A third course of action is to deemphasize the estimation of disease costs but to demonstrate that prevailing compensation systems are grossly underpaying for the costs of disease by systematically excluding most of the serious cases of illnesses that arise. This would appear to be the firmest kind of analysis that can presently be undertaken. That approach will be left for a later forum.

Footnotes

¹For an elaboration of this, see Peter S. Barth, "The Effort to Rehabilitate Workers' Compensation", The American Journal of Public Health, forthcoming.

²The President's Report on Occupational Safety and Health (Washington, D.C.: Government Printing Office, 1972), p. 111.

³Estimating the Cost of Illness, Health Economics Series No. 6, Public Health Service Publication No. 947-6 (Washington, D. C.: Government Printing Office, 1966) and Economic Costs of Cardiovascular Diseases and Cancer, 1962, Health Economics Series No. 5, Public Health Service Publication No. 947-5 (Washington, D. C.: Government Printing Office, 1965)

⁴Ronald E. Jones, "Alcoholism and the Workplace", Manpower (February 1975), pp. 2-8.

⁵Thomas F. Mancuso and Ben Z. Locke, "Carbon Disulphide as a Cause of Suicide: Epidemiological Study of Viscose Rayon Workers", Journal of Occupational Medicine, Vol. 14, No. 8 (August 1972), pp. 595-606.

⁶Richard Thaler and Sherwin Rosen, The Value of Saving a Life: Evidence from the Labor Market, Presented at the NBER Conference on Income and Wealth, Household Production and Consumption, Washington, D.C. November 30, 1973.

⁷Wayne Vroman, "The Incidence of Compensation Insurance Premium Payments", Supplemental Studies for The National Commission on State Workmen's Compensation Laws, Vol. 11 (Washington, D. C.: Government Printing Office, 1973), pp. 241-270.

⁸The Report of the National Commission on State Workmen's Compensation Laws (Washington, D. C.: Government Printing Office, 1972), p. 25.

⁹For example, See Compendium on Workmen's Compensation (Washington, D. C.: Government Printing Office, 1973), Chapter 2.

REVISED DRAFT

of PART II

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PART II

As the discussion previously has suggested any attempt to estimate the costs of occupational disease involves many assumptions for want of data. Since there are many types of occupational disease, each arising in varying types of work situations affecting workers of varying age, sex, and other demographics, and each having identified with it unique but still unknown patterns of morbidity and mortality, it is virtually impossible to talk about a single cost estimate for all occupational disease. Rather the analyst at best must look at particular kinds of diseases and then seek to aggregate estimates. Yet for most particular diseases, data is also missing, and at best what is available to the analyst are particular cases.

In this paper, we shall look at one "case," that of chromatic workers with higher incidences of lung cancer. While the data we shall analyze is taken roughly from a true case presented recently by Dr. Thomas Mancuso at a conference, the purpose of the analysis is to indicate fundamental problems and implications of costing out occupational disease, not to develop precise cost estimates for the particular case. We have intentionally oversimplified the case so that the most salient facts in the case affecting costs can be highlighted and made understandable.

In this case, a 1964 survey found that of some 350 chromate workers in an Ohio factory in the 1930s, 41 subsequently died of lung

cancer, an excess of 34 over the expected mortality rate for a population similar in demographic characteristics. This excess of 34 deaths is claimed to be attributable to the work setting and the evidence of the existence of an occupational disease. The factory worker population had demographics roughly representative of blue collar workers in manufacturing. The latency period among those who subsequently died was 27 to 36 years, with most period lengths clustering around 31 years after first exposure. Although the actual period of illness preceding death during which the individual was prevented from working was much shorter, we shall assume an average period of one year of total disability preceding death. This assumption overcompensates morbidity but perhaps adjusts for the absence of any direct data on illness or losses in productivity prior to exit from the labor force.

Since the modal age for those dying of cancer was 61, we shall assume that the average victim began work in the factory in 1933 at the age of 30 and died of lung cancer in 1964. Those who died were found to have stayed in blue collar employment throughout their work life and to have made the average wage in manufacturing in 1933. We thus shall assume that the average manufacturing wage for their respective age group would be representative of their potential earnings after 1933.

Given these sparse facts, what already can be said about the costs of occupational disease? From the earlier conceptual discussion, we know that the principal types of costs of concern are loss of worker output, the costs of health treatment, and administrative costs.

Loss of Worker Output

The most important of these is the loss of workers' output. In

this particular case, we are talking about the loss of production for 34 workers. Given the particular profile of the chromate workers, the average loss of output per worker is about five years worth of production -- the year of total disability and the premature death at 61, some four years before normal withdrawal from the labor force at age 65. If some workers had chosen earlier retirement, their lost work time would be even less than five years. Since Social Security guidelines for retirement benefits have been making it possible to retire at younger ages (e.g., 63 rather than 65), estimates well in advance of lost output may be biased upward.

These five years of lost production are, to be sure, important, but clearly are much less than the 20 to 40 years of lost output that one normally associates with total disability from work-related accidents. It is instructive to examine how the overall loss of output is affected by the particular facts of the chromate factory example. Ultimately, of course, the amount of lost output will become the principal determinant of the economic costs of the occupational disease.

First, the age of the affected workers is an important factor. Given the modal latency period of 31 years and modal age at death of 61, we assumed that the average individual began work at age 30.¹ If such workers had begun working at the factory at age 25, the amount of lost output would be ten years worth, rather than only five years worth, since the years of lost labor force participation before normal retirement would be greater. On the other hand, if the modal age for beginning work had been merely 35 or older, there would have been no lost output

¹See footnote #6 on page II.10.

for most of the workers² since most workers would have been immobilized at a time when they had already retired from the labor force. Presumably, the age of the labor force at initial exposure was determined by labor market factors totally unrelated to the occupational hazard or the pattern of disease.³

Second, the length of the latency period strongly influences the loss of output. Although the modal latency period was 31 years, the latency period did vary from 27 to 36 years. Given the modal age of 30 for first exposure of workers who later died, a latency period which averaged only 27 years on the average would have resulted in nine years of lost output rather than only five. On the other hand, a latency period which had averaged 36 years would again have resulted in most workers suffering morbidity and mortality at a time when they had already withdrawn from the labor force; thus there would be little loss in economic output. While latency periods vary dramatically from disease to disease, a 20-year latency period is not uncommon. For a 45 year old or older workers, a 20-year latency period would normally result in no economic loss of output at all. The longer the latency period of an occupational disease, the older the worker, the less the economic costs imposed by the work setting giving rise to the disease.

A third factor affecting the overall loss of output was the finding in this case that morbidity amounted to only a year of total disability prior to death. In fact, even the year of total disability was

² Note that there still would be some lost output, since those workers under the age of 35 would still lose a few years of working.

³ Actually, there is some evidence in the data on the chromate factory workers that the relatively younger workers in the factory were more susceptible to the hazards and had higher rates of incidence of the fatal lung cancer.

a conservative assumption designed to increase costs. Most workers were employed until only a few months before death. The average loss of time from the job was well under a year. For other occupational diseases, there might be a much longer time of total disability prior to mortality. Indeed, there may be periods of partial disability prior to total disability which force a change in occupation and thus loss of output. There may be disability in the form of increased use of sick leave or declining productivity on the job. Separating out these latter losses in output from the normal declines in productivity which came with age is certainly feasible, but empirically difficult. In the models developed for vocational rehabilitation and the general workers compensation program, the separation is done by comparing the earnings of workers subject to disability with the earnings of the average worker of similar age, sex, and education. For workers suffering occupational disease, data on lost work days and productivity over the period of time prior to leaving the labor force are less available. For evaluating the morbidity costs specific to the occupational disease, one would also like comparable data for a comparable labor force in terms of demographics in a closely related type of work -- again, data not readily obtained. In the absence of such data, one compares worker earnings with average earnings of all workers in manufacturing or in a large industry. With such a high level of aggregation for the "comparison group," these less obvious morbidity costs may often not be visible.

The impact of the morbidity findings are clear. If the period of total disability were longer, the amount of lost output would be greater. If the individuals in the chromate factory who later died had

suffered a 25% decline in productivity over and above that normally experienced for their fifties age group on the job during their last ten years of working, the amount of lost work output would increase by 2.5 years worth.

A fourth factor affecting the loss of output estimate are the assumptions of full employment both in the economy and for the worker. When the economist or cost analyst says that the economy has lost four years of output when an individual dies prematurely at age 61 from an occupational disease, an assumption is being made that the individual would otherwise have been employed full-time. The logic of this convention in economic analysis is that analysis should separate losses due to disability from losses due to social policy tolerating an economy of less than full employment.

In terms of the real experience of workers, the assumption of full-time employment might well be challenged by the millions in the 1970s waiting in lines to collect their unemployment checks. Clearly, some individuals might have experienced unemployment unrelated to the disease during the four to five years for which we are crediting their output losses to the disease.⁴ Yet such abandonment of the full employment assumption for the worker does not result in a significant reduction

⁴This assumption of the full-time employment for the chromatic worker is akin to the assumption in manpower program evaluations that individuals successfully placed on a job after training or vocational rehabilitation remain employed for the duration of their normal working lives. Survey studies and the increasing use of Social Security data for follow-up invariably show large proportions of the workers to have suffered unemployment or morbidity for varying amounts of time after such placement. At the same time, it is true that the chromatic worker would have been a very experienced worker by age 60 and thus less prone to lay-offs, in contrast to the worker in manpower training programs who usually comes into such programs unemployed and with limited past work experience or education.

of the estimated output loss. Even if we would assume a 10% probability of unemployment for three months each year for the average worker, the output loss would be reduced by only one and a half months from the five years estimate.

Even more challengeable by the layman might be the assumption by the economist that the withdrawal of the worker from the labor force because of sickness or death necessarily means the loss of output at all, when so many other unemployed individuals would seem able to step into the job and continue production. Essentially, the economist is assuming that there is full employment in the economy, that there is no surplus of labor to pick up the slack left by the sick or dead worker. The assumption of full employment for the economy is a convention in the benefit-cost analysis of human capital investments, lest service programs find all their efforts undervalued because of independent decisions by other policymakers to tolerate a social policy of less than full employment. If high rates of unemployment are accepted as a normal adjunct of national social policy, then much of the economic rationale for investment in education, health services, and manpower programs would be undermined.

Having measured the amount of lost work output, the next task confronting the cost analyst is to value the output. The analyst relies on economic theory here, believing that individuals are paid as a wage their marginal productivity, so that the earnings of an individual accurately reflect the value of his or her output as measured by society's willingness to pay for the final good or service. The theory makes many assumptions about the competitiveness of the market, the information available to individuals, the acceptability of the societal income distribution which underlies consumers' willingness to pay, and the divisibility

of the good or service being purchased, but these assumptions are generally accepted within the conventions of cost analysis, and will not be argued here.

Following conventional practice, we might value the work output for the five years of the 34 chromate workers at the average weekly wage earnings of a manufacturing worker during the period from 1963 to 1967. Given this approach, the total loss of output per worker was roughly \$24,900 in then current dollars or some \$42,300 in output valued in July, 1975 dollars. The total loss of output for the 34 workers was thus about \$1,435,200 in July, 1975 dollars, at first glance an appreciable sum.

Again, however, there are many nuances affecting the estimate even of the current dollar value of the output of workers. One ideally would like to know the actual earnings prior to departing the labor force of the cancer fatalities, as a better measure of earnings potential than the average manufacturing worker's wage. At least, one would like to use the wage of an older worker with extensive work experience and comparable sex, educational, and racial characteristics. For an older white male, the average manufacturing worker's wage, given the overall demographics of the labor force, may reflect too heavily in some decades the earnings of many younger and less productive workers. At the same time, older workers approaching retirement do experience a decline in earnings relative to the earnings of those in the prime ages of 35-55.⁵ At the same time, the average wage even for a defined demographic group may reflect

⁵ Thus the average earnings of the employed civilian labor force (not just manufacturing employees) averaged \$7,483 in the 1970 Census for those aged 55-65, in contrast to \$8,165 for those aged 35-55, \$7,052 for those aged 25-35, and \$3,541 for those under age 25.

not that groups' marginal productivity, but rather societal patterns of discrimination which systematically undervalue the individual's production. Thus, one observes systematic differences in the wages of women and some racial minorities for comparable work with white males of comparable education. To accept actual wages or earnings as the bases for estimating the costs of lost output can be misleading to the extent that discrimination unrelated to productivity is apparent.

Also, in modern industrial economies, wage earnings are increasingly becoming a smaller share of the worker's total compensation for his output, as fringe benefits increase. The fringe benefit compensation clearly must be added to wage earnings in estimating the value of the worker's output given economic theory. Yet fringe benefits vary from industry to industry. A 1967 Chamber of Commerce study indicated, however, that for the typical manufacturing employer, fringe benefit compensation totalled some 19.7% of all wage compensation for employees. Our estimate of the value of lost output based on worker's compensation must then be increased by some 20% to reflect total compensation. Thus, the true value of the lost output was some \$1,722,250 in July, 1975 dollars.

Another problem of estimation is choosing the year in which to express our dollar values. Inflation has made the unadjusted dollar a most unreliable unit of value across time. We have chosen 1975 dollars so that our estimates will convey an accurate meaning to our contemporary audience. The use of 1975 dollars rather than current dollars at the time (1963-1967) the wages were earned, increases the dollar estimate of the loss by more than \$700,000. Were losses expressed in 1933 dollars, the year when the average worker began employment and the year in which

charges to the employer to compensate the loss in output resulting from the hazardous employment setting would on the average have commenced, the dollar value of the total loss in output would be less than \$400,000.

The problem of looking at costs from the perspective of the decision-maker at the time the production decision is made which incurs the hazardous risk to health brings into focus the most fundamental adjustment to costs -- discounting to present value. Regardless of the base period for expressing dollar values, the value to society in 1933 of the output lost in 1963-67 would not be the same as the value to society in 1963-67.

The appropriate discount rate for calculating present value has long been the source of much theoretical and empirical debate among economists. Let us look at the effects of 4%, 7%, and 10% discount rates, a commonly used range of rates for valuing future benefits and costs of societal actions. Given a loss of output from 1963-67 of \$1,722,250, the present value of that loss in 1933 (in 1975 dollars) would be only \$82,085 with a 10% discount rate, \$198,125 with a 7% rate, and \$491,125 with a 4% rate. In short, given the long latency periods of occupational diseases, the present value of their economic costs are considerably less than one might think.⁶ The higher the discount rate used, that much lower the economic loss estimate. The earlier the worker's retirement or the later the onset of morbidity and the involuntary withdrawal from the

⁶In the paper presented by Dr. Mancuso at this conference entitled "Medical Aspects," additional information is provided giving the age distribution of the afflicted workers. When the analysis is redone for the earnings losses experienced by each individual worker rather than using the modal worker to represent all workers, the overall estimate of losses for the group of roughly 34 workers doubles -- \$813,765 versus \$491,125 using a 4% discount rate, and \$193,535 versus \$82,085 using a 10% discount rate. Nevertheless, the increase in the loss estimate remains very small in absolute terms, and the overall conclusions concerning the low present value of the social costs of the hazardous exposure in 1933 are unaffected.

labor force, the less the economic costs, irrespective of the initial age of the worker at first exposure. Even with a 20-year latency, however, the present value of a \$1,000 loss in future output is only \$149 with a 10% discount rate. With the more liberal 4% discount rate, the present value of the \$1,000 of lost output becomes \$456, three times as great as for the 10% discount rate, but still less than half the current value of the output at the time it is lost.

The impact of discounting clearly dwarfs many of the other factors discussed earlier in measuring and valuing the amount of lost output. The interaction of the most important factors of length of latency period, age of worker at exposure, assumed retirement age, and discount rate is instructive. With younger workers or shorter latency periods, the years of lost output increase. The value is still much less because of the need to discount, but the reduction in value due to discounting varies greatly in magnitude with how soon the loss is realized. For workers of the same age as the chromate factory victims of lung cancer, a shorter latency period produces relatively greater loss estimates even with discounting, because the first years of loss occur sooner when the effect of a compounded discount rate is less significant. For younger workers at time of first exposure, but given the actual 31-year latency period, the reduction in the value of lost output is relatively greater due to discounting. There are more years of lost output but the years are more distant in time, and with high discount rates like 10%, the losses in output more than 34 years hence do not amount to much in present value.

Medical Costs

The second broad type of economic costs associated with the occupational disease of the chromate workers are the costs of the resources expended to diagnose and treat their lung cancers. Such costs might potentially have included hospital, rehabilitation service, home care, drug, and other treatment costs, as well as an imputed share of the research costs historically incurred on aspects of the disease. The available data again is meager. We do not know anything about the specific treatment received by the chromate workers to come up with specific cost estimates based on fact. Only crude guesstimates are possible. Public Health Service figures for the costs of cancer patients in hospitals in 1962 found daily hospital charges ranging from \$35 to \$43, depending on the type of cancer. Other figures for the same source show an average cost per such patient to be \$15-16, perhaps reflecting the marginal variable costs of treatment. The average length of stay for lung cancer was apparently 16 days. Even assuming hospital costs of \$43 a day, the total costs of hospital treatment would then not exceed \$700. These data from 1962 are fortuitously appropriate since the modal worker would have been receiving treatment in 1963. Also, these 1962 medical cost figures are for treatment representing both a more advanced technology than was available in 1933 and the inflation in medical care costs over the intervening period, and thus overestimate the costs to be indemnified in 1933.

Since the chromate workers were disabled for less than a year before death, they presumably did not receive vocational rehabilitation services and medical expenses were also relatively limited. There undoubtedly were additional costs for medical care by doctors visiting

homes, for drugs, and perhaps for nursing care. Given the advanced age of the victims (and thus the lower probability that spouses would be in the labor force) and the relatively short period of illness prior to death, it is unlikely that spouses would have left the labor force for any long periods of time to provide nursing care. Still some such economic losses might have occurred. Given that the current earnings of these workers was less than \$5,000 in 1963, it is unlikely that total expenses would have exceeded more than half their income even including hospital costs. Assuming an excessive \$2,000 in medical costs per worker, total medical costs attributable to the chromate factors exposure would have a present value in 1933 (in 1975 dollars) of only \$6,700 for all 34 workers at a 10% discount rate, \$15,335 at a 7% discount rate, and \$36,000 at a 4% rate. Clearly, medical costs while significant are secondary aspects of costs when compared to foregone output, especially when higher discount rates are used.

This crude analysis of medical costs was done retrospectively. A prospective estimate of medical costs for a worker population vulnerable to an occupational disease would be even more problematic. The inflation in health costs has consistently exceeded the general inflation rate for the economy and remains highly unpredictable. Moreover, technology and knowledge in the health industry is always changing. New discoveries might make early detection and treatment of the occupational disease possible so that the probability of early death or withdrawal from the labor force was greatly reduced. Foreseeing such improvements, much less estimating their implications both for medical costs or loss of output is difficult, if not impossible.

Administrative Costs

As pointed out in Part I, the third major component of the economic costs of occupational diseases are the costs of the resources employed in administering the systems existing because the diseases occur. Establishing the litigation and administrative costs of insurance carriers and governmental agencies for any particular disease imposes great demands on data which currently cannot be met. Administrative costs were not incurred to any significant degree. Litigation also appears not to have come into play.

The expansion of coverage under Workers' Compensation to such workers in the future would of course entail some administrative costs, although the amount again is cumbersome to estimate, since it heavily depends on the nature of the insurance system established. The proportion of premiums that go for administrative expense -- the expense ratio -- averaged in 1969-72 30% for private stock companies and less than 13% for State funds. Since these ratios have remained reasonably stable as the number of workers covered in the system has grown, we shall not assume economies of scale permitting the marginal administrative costs of expanding coverage to workers suffering from occupational disease to be less than the current average costs per worker in the Workers' Compensation System. Assuming 65% of the worker's loss of earnings were replaced, the 1969-72 experience suggests administrative expense to run from 10% to 28% of that year's loss of earnings, depending on whether the private carrier or State Fund expense ratio is the more adequate for proxying the true social costs of administration.

Some would see the State Fund as the better proxy, since exclusive state operation avoids the "unnecessary" costs of attracting risk capital and selling policies inherent in the competitive private insurance industry. The choice of proxy is problematic, however, because of the differing accountings of cost and provisions of service between the types of funds. Private carrier costs include taxes paid -- a transfer payment -- while state funds are exempt from such payments. Thus, private carrier costs overestimate social costs. At the same time, state fund costs fail to account for services provided by other governmental departments and agencies which may be critical to the fund's operations. The cost of such services is provided by separate legislative authorization, not by payment from the State Fund's budget. State fund administrative costs thus underestimate social costs. Also, private carriers generally provide special consultative services in areas like accident prevention, rehabilitation, payroll auditing, merit rating, and program planning that may be less adequately furnished by State Funds. To the extent that such services are seen as desirable and necessary aspects of administration, State Fund costs are again then underestimated.

Aggregating the various cost estimates above for loss of output and medical costs, which would appear to be the principal economic costs associated with the lung cancer resulting from work in the chromate factory, one finds total economic costs to have a present value in 1933 (but in 1975 dollars) of \$527,125 using the 4% discount rate, \$213,460 with the 7% rate, and only \$88,785 with the 10% discount rate. Spread across the 350 workers exposed to hazard by their employment in the factory, these

costs come to \$1,500, \$610, or \$250 per worker, depending on the discount rate used, and assuming employers had to indemnify all the costs in the first year of the worker's employment. In fact, however, the disease which produces the output losses is the result of the cumulative exposure of the worker while working in the factory. If we assume that the average worker is employed ten years in the factory after 1933, the cost per workers for an average year of employment would be roughly \$150, \$61, and \$25, depending on the discount rate used.

Other Economic Costs

Several social costs are still being omitted under this analysis. There has been no valuation of the loss in nonpaid work output which the fatalities presumably would have performed in their homes. Surveys have shown that the average male performs seven hours of such labor a week. The appropriate price for valuing work is unclear, however. If valued at the worker's then current wage rate, the value of this foregone home production due to early mortality or morbidity would increase the total estimated value of foregone output by 15-18%, depending on the number of hours one assumes constitutes the normal work week of a chromate factory worker. On the other hand, if valued at replacement cost, the valuation of the foregone home production is less clear. Some home production activities (e.g., plumbing, electrical repair) have high replacement values in the market; others (e.g., child care, yard work) less high values. It also may be unreasonable to assume that individuals in their early sixties would perform as much home production with the same degree of efficiency or quality as does the average (much younger) worker.

Another omission is any value to be assigned to the mental and emotional anguish of the individual and his or her family resulting from the morbidity and early mortality associated with the occupational disease. Again, such anguish is not readily reflected by prices revealed anywhere in the market place. Were there a market for postponing or avoiding such pain or death, the "willingness to pay" of the family for such avoidance might well equal the family's wealth and current income at the time they become aware of the cancer condition. Their willingness to pay for avoiding the risk of such a cancer back in 1933, when the decision was made to begin work in the chromate factory, is unknown, since again no market existed for such risk avoidance. Since the risks associated with the factory employment were not knowable to the individual in 1933, there can be no claim that the worker received a premium in pay compensating the health risk. That such psychic costs are not readily measurable and indeed tend in our society to receive valuations via jury deliberations and court precedents does not mean that the costs are not valid and important economic costs. The costs are indeed valid and should be considered.

At the same time, it should be noted that death and sickness are inevitable and usually bring anguish. The unique costs of anguish associated with occupational disease are the greater degree of anguish (if any) of premature mortality or higher morbidity rates than might otherwise have been anticipated. While no one can confidently compare mental anguish across individuals, it seems reasonable to assume that given the advanced age (61) of the chromate factory workers at death, the disruption

of family would be less than would have occurred with the death of a younger worker with presumably more family members dependent on his or her emotional, psychological, physical, and financial support. There also is clinical evidence to suggest that for family members and even the dying individual, acceptance of the death may be easier and thus mental anguish less, the closer the age of actual death to an age when death might in any case have been anticipated. These arguments are not intended to suggest that there is no economic cost associated with the mental anguish suffered by the chromate factory workers and their families. Rather, the arguments are intended to show that given the long latency of the disease and the demographic (age) profile of the worker population, the psychic costs probably were less significant than might be anticipated for an average worker suffering a job-related fatality.

Different Cost Perspectives

The costs analyzed above have been the economic costs to society of the occupational disease suffered by the chromate factory workers. As noted in the first part of this paper, there are numerous other perspectives from which costs might be analyzed. One could look at the costs to taxpayers. From this perspective, only the foregone taxes on the lost earnings and output of the factory workers are relevant, not the full amount of their production. Since fringe benefit compensation, home production, and psychic benefits are not taxed, such losses do not affect taxpayers directly. At the same time, the premature mortality and morbidity may require the public sector to provide help in the form of income maintenance and subsidies of medical costs to the family of the afflicted

worker. Such expenses are transfer payments from the perspective of society rather than unrecoverable uses of society's resources (and thus economic costs). Nevertheless, the costs of such transfer payments and foregone taxes could be large. To the extent that society would accept the responsibility for replacing the full economic losses incurred by families, the sum of taxpayer costs could well approach or exceed in magnitude society's economic costs.

The perspective of the employer has been outlined in the first part of the paper. In this particular case, the occupational health hazard was presumably unknown at the time of the production decision. Thus, presumably no wage premium was paid workers for incurring the health risk, and no assessment was levied on employers to indemnify the future losses of workers or the society. The full burden of costs were shifted from the employer to his workers and the taxpayer.

The perspective of the employee and the family resembles that of society at first glance, but ultimately is quite different. The family suffers the loss not only of earnings over a five-year period, but the enjoyment of financial retirement benefits accrued over a lifetime of work. To the extent that there are substantial transfer payments being received from society to make up the earnings and retirement losses or the medical expenses, whether such payments are received directly as through a welfare check or indirectly through a government subsidy of hospitals and then a lower price levied on the family for medical services, the family's financial losses are somewhat reduced. More importantly, however, the family's loss in economically evaluable welfare is clearly different in

kind and perhaps orders of magnitude greater than society's, even when the financial loss may be commensurable. The consumption, psychic, and home production losses clearly are valued much more highly than could be reflected in financial ability to pay.

Were this occupational disease to be covered under the Workers' Compensation system, cost perspectives would become even more complex. Costs to the employer, government, and the insurance system would depend on the proportion of earnings which insurance would seek to replace, provision for inflation over time, additional benefits for dependents, the organizational arrangements for administering the system (and thus administrative costs), the rate of return on investment of insurance premiums during the latency period, and the extent to which such costs were divided among the employer, the industry, and taxpayers as a whole. Similarly, the incidence of the costs would vary according to the ability of employers to shift their related costs backward and forward. The complexity of shifting analysis has been outlined earlier in the first part of this paper.

While this example has shown that it is not difficult to estimate the costs retrospectively of occupational disease from a societal perspective, it should also be noted that the example does indicate the difficulty of embracing occupational disease under a Workers' Compensation system where employers are assessed rates for indemnifying the full costs of current production decisions. Insurance companies are in the business of evaluating risks, but usually determine risk actuarially, based on historic experience with many individuals. Anticipating the future costs

of occupational disease with long latency periods involves great uncertainty. Even when the health hazard is known, estimating the magnitude of earnings losses and other costs requires guesstimates of inflation, productivity-based wage increases, and retirement policies over long periods into the future. Often, however, the health hazard is not even known at the time of the production decision which creates the hazard. Firms and industries are constantly introducing new technologies, processes, and chemicals for which the existence of health hazards may not be known until many years later when illnesses and death actually occur. Even if the possible existence of a health hazard is known, the probability and degree of hazard for a worker may not be known. When the magnitude of future earnings losses is contingent on cumulative exposure to substances, the loss associated with any particular time period of exposure is likely to be even more difficult to predict in advance.

If the costs of occupational disease were not indemnified at the time of the original production decision but rather compensated retrospectively through assessments on employers at the time the losses of earnings actually occurred, the financial magnitude of the levies would look very different. Discounting would not be relevant nor would spreading the costs across the full period of a worker's employment in the factory. The full costs would be \$52,655 per worker suffering the disease. Spreading the cost across all 350 workers working in the plant also becomes irrelevant, since the production activity involving the workers was several decades in the past. The costs might be spread, of course, across current workers in chromate factories, but such a financing decision is

at best only indirectly related to equity or the philosophical principle of having employers bear the full social costs of their production decisions. The employers who were responsible for the exposure in 1933 which resulted in the occupational disease may no longer be in business when the morbidity becomes apparent. Similarly, the stockholders and consumers who reaped the benefits in 1933 of the uncompensated costs to the chromate workers will be different people from current stockholders and consumers. Current chromate factory working conditions may also involve very different risks to future health.

Conclusions

In this paper, we have sought to estimate the social costs of a particular case of occupational disease. We have not estimated the program costs of embracing the areas under the current workers' compensation system. The estimation of social costs has been intentionally oversimplified to point out both the sensitivity of costs to particular facts unique to the case and fundamental problems in data availability for making empirical estimates. We have also tried to show both the conceptual framework and the underlying assumptions which conventionally guide such estimates. For use by the Task Force on Workers' Compensation, a model is being designed to analyze the costs of alternative compensation programs. The model estimates both social and also program costs specific to a population defined in terms of distribution of age, sex, and other demographic characteristics. In this present example, far less is known about the population afflicted by the occupational disease than is routinely known of a population of claimants. For estimating the costs of

occupational disease, it is necessary to provide the basic information described above specific to the particular type of disease for which analysis is desired. Current data availability and limited knowledge of the full scope of occupational disease and its impacts make an aggregated estimate of the social costs of occupational disease impossible at the current time.

The example, however, has hopefully illustrated several basic points other than the difficulty of making estimates with current knowledge and data. First, it has pointed out key factors in determining overall costs -- the latency period, the age of workers at exposure, the discount rate, the severity of disability, retirement assumptions, the morbidity as well as the mortality pattern.

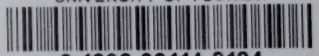
Second, the example has indicated that the costs of occupational disease to be assessed employers or society at the time production decisions are made, which many have feared would strain too greatly the current Workers' Compensation system, are not nearly as great as it appears at the time the losses are realized. Because of the long latency periods and discounting, the future monetary earnings losses to be indemnified are much less when expressed in the present value terms appropriate for designing insurance assessments. A social policy of preventing production-related activities giving rise to occupational disease would thus sometimes result in economic losses greater than the costs associated with the disease. The particular pattern of latency will vary and the proportion of exposed workers who are ultimately afflicted will vary from disease to disease, of course, and require separate estimation. Rather

than wait for full information to do more precise cost estimation, however, it may often prove feasible based on the simple kinds of ballpark estimates provided here to conclude that a particular occupational disease if included under the compensation system would not produce insolvency.

At the same time, estimating the costs needed to indemnify future losses given long latency periods involves the consideration of so many uncertainties that accurate "fair" indemnification rates may be difficult to determine by private or state insurance agencies, even when rates are not threatening to solvency. On the other hand, retrospective indemnification today of past production decisions in an industry, would involve large costs and questions of equity if indemnification costs were levied uniquely on firms currently operating in the industry.

The final determination of the policy appropriateness of expanding the Workers' Compensation system or developing supplemental systems to include occupational diseases rests on the resolution of many questions. As the above estimates show, however, the failure to act need not be based on the uncertainty or incompleteness of the cost estimation.

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